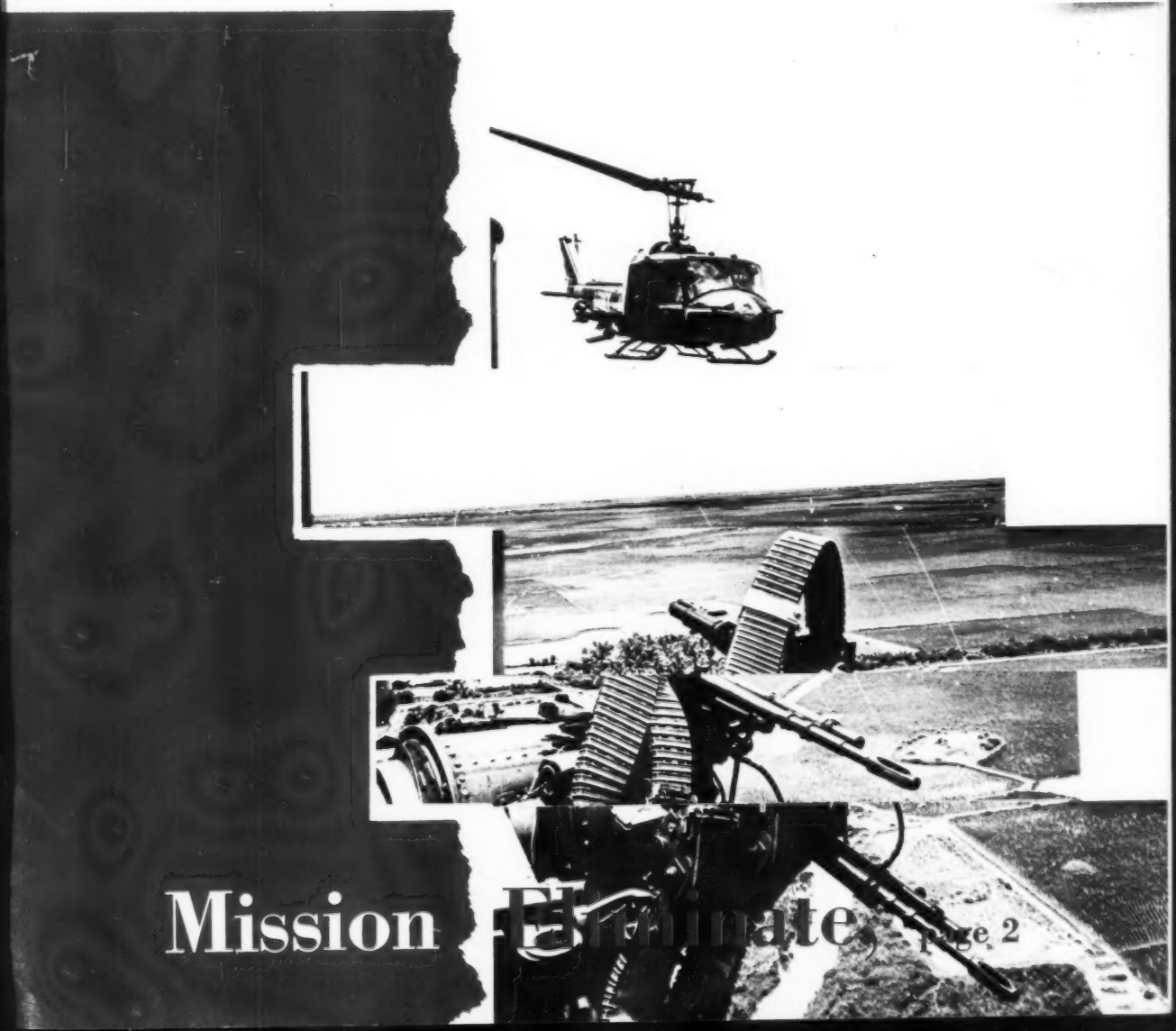
UNITED STATES ARMY MARCH 1966

AVIATION DIGEST



Mission Eliminate, page 2

UNITED STATES ARMY AVIATION DIGEST

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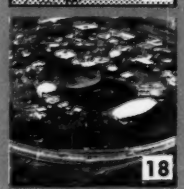

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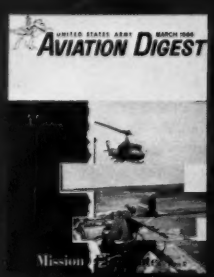

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

The DIGEST is an official Department of the Army periodical published monthly under the supervision of the Commandant, U. S. Army Aviation School. Views expressed herein are not necessarily those of Department of the Army or the U. S. Army Aviation School. Photos are U. S. Army unless otherwise specified. Material may be reprinted provided credit is given to the DIGEST and to the author, unless otherwise indicated.

Articles, photos, and items of interest on Army Aviation are invited. *Direct communication is authorized to: Editor-in-Chief, U.S. Army Aviation Digest, Fort Rucker, Alabama.*

Use of funds for printing this publication has been approved by Headquarters, Department of the Army, 29 December 1964.

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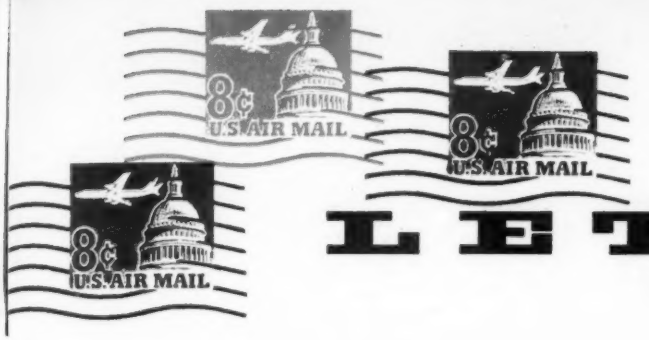


LETTERS

Sir:

I have been an avid reader of your fine magazine for many years. Often I thought of writing you about the wonderful job you are doing disseminating information about our program. Your January issue on Vietnam did the trick, and you are receiving the first letter I've ever written to an editor. Beginning with the beautiful model on page one and straight through to the moving scene of the soldier with the Vietnamese family on the inside back cover, let me just say CONGRATULATIONS for a job well done!

CAPT M. BAMFORD
Dept of Maintenance
Fort Rucker, Alabama

Sir:

As the former Deputy 10 for U. S. Army Support Command, Vietnam I would like to congratulate you and your staff on the outstanding January issue of your magazine.

Having served in Vietnam, and having bummed as many rides from aviators as I did from all of you there, I feel a very close relationship to Army Aviation. My ability to travel the length and breath of South Vietnam, and thus tell the Army story, was dependent on the Army Aviation units, and, as in everything else, they came through with flying colors.

Once again, congratulations on a really fine magazine and my best regards to my many Army Aviator friends.

MAJ CHARLES P. MORN
MPC
Information Officer

Sir:

Captain Webster, author of article entitled "Army's New Sidearm" in November issue, is a good writer. However, the information regarding weapons he discussed is not accurate. He does not know his subject very well or he would know that with the hammer at half cock position the .45 automatic safety cannot be placed on.

Secondly, while the .45 caliber automatic as issued may not be the most accurate pistol, it is considered as accurate as the caliber .38 special official police, 4-inch barrel as issued by the military services and as reliable or more so under certain conditions. It was proved many years ago by the United States Army that the .45 automatic was more reliable under dusty or muddy conditions than double action revolvers including the Colt new service model 1917 and the Smith and Wesson models used at various times by the military.

With modern ammunition, misfires in either type weapon are very remote. It is granted that the individual has more choice of ammunition in .38 caliber. However, a shot cartridge was issued in .45 automatic caliber for survival purposes. Disadvantage was it would not feed through the magazine and had to be loaded directly into the chamber. It does contain more pellets and is better suited for hunting small game than the .38.

I agree that the .38 will probably be more popular with air crews if for no other reason than it is lighter, but please keep the facts straight.

LT COL RALPH O. BENNETT
Chief, Avn Test Div
U. S. Army Arctic Test Center
APO US Forces 98733

Sir:

Allow me to offer my congratulations, through your excellent publication, to the person or persons responsible for the adoption of the .38 cal revolver to be authorized to be issued to Army Aviation personnel. Also, I would like to offer a few comments on Captain Webster's fine article "Army's New Sidearm." I am expressing my personal opinions as a lifelong firearms enthusiast.

First of all let me say that in Lieutenant Neverready's case, the issue .45 automatic would be next to impossible to handle, and in Lieutenant LTBA's case, the issue .45 was so loose and ill-fitted that accuracy was hit-or-miss for the average person, even under optimum conditions. Even the finely tuned target automatic gives no assurance against jamming. It only lessens the frequency of such a malfunction.

I agree wholeheartedly with Captain Webster's perference of the .357 magnum revolver over the .45 or .38 special. The .357 magnum not only possesses greater shocking, or knockdown power, but because of the interchangeability of ammunition (.357 or .38 spl.) it is a much more versatile, dependable, and valuable weapon, both defensively in hostile areas, and for survival in remote areas.

Now for the pros and cons of make and model of the revolver to be issued, concerning the most important physical feature of the revolver, and I speak from personal experience.

The sidearm illustrated in Captain Webster's article appears to be one manufactured by Colt, and although I have a great respect for the fine weapons put out by this company, it has one serious drawback. The ejector rod, which is directly under the barrel when the cylinder is closed, is unprotected. If for any unavoidable or unfortunate reason this rod is bent or sprung out of line, ejecting the fired cases and inserting new cartridges becomes a difficult and time consuming chore.

Is it possible that the personnel of the Special Air Warfare Center have failed to take into consideration this very serious drawback, and have not taken into consideration the revolvers made by Smith & Wesson which have a fully protected extractor rod. If a man is flying in combat, or if he is forced down far out in the boondocks, he has enough to worry about without wondering whether or not his survival weapon is dependable, and whether it can stand possible extremely rough usage.

May I suggest that the fault that I have pointed out be given careful consideration and study by the Test and Evaluation personnel.

1/LT JACQUES G. HOFFMANN, RET.
100 James Dr., N.E.
Sierra Vista, Ariz.

Sir:

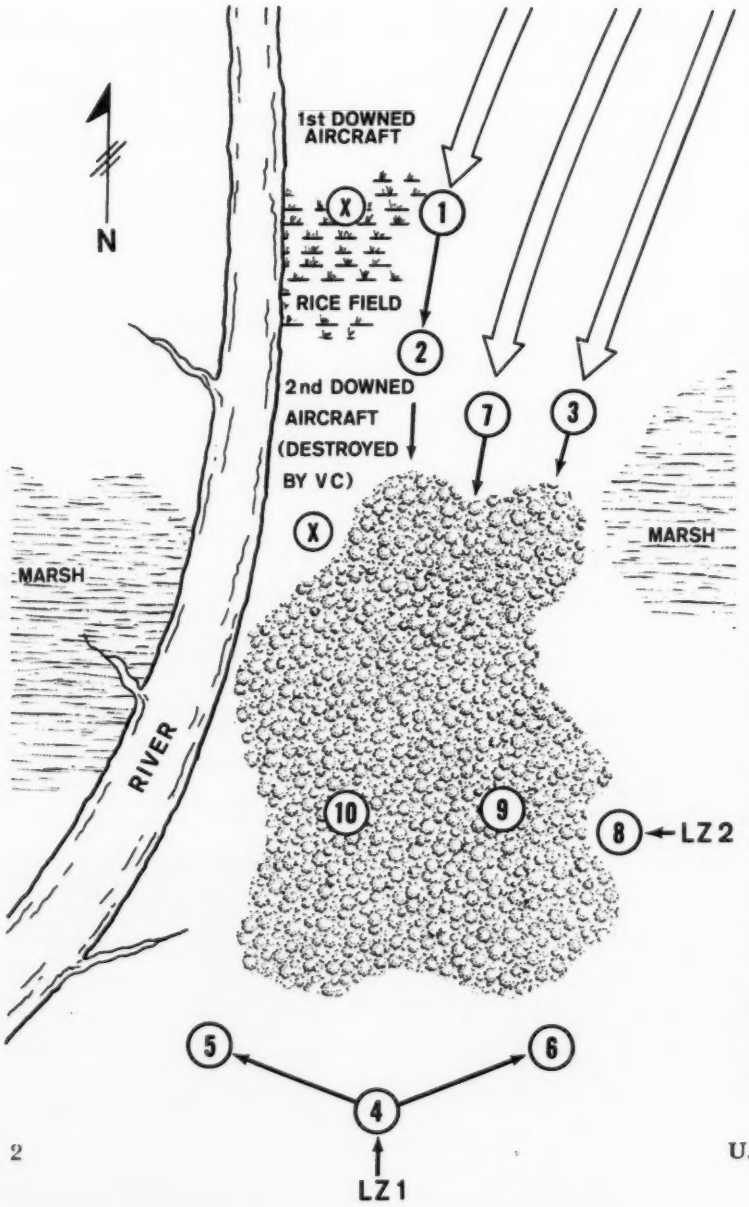
The pat-on-the-back from Major Shiro in the Letters section of the December issue was well deserved.

Being a monthly cover-to-cover reader, may I make a suggestion which I think will make your layout even better? It's this. Print your articles on continuous pages thus avoiding the "continued on page 25" technique which detracts from the content. A good example is the "Santa Learns About Flying" article in the December issue. Why continue on

Continued on page 10

Mission Eliminate

William H. Smith



LATE ONE afternoon we learned that a company of Viet Cong had been seen in a thick jungle-like area south of our airfield. The local ARVN (Army Republic of Vietnam) ranger battalion was anxious to send them to whatever place it is that good communists go. The ARVN rangers felt our helicopters would help the VC get there faster and wanted our help.

We devised a pincher movement and called it "Operation Eliminate." One part of the ranger battalion would move along a preplanned route and seize objectives 1, 2, 3, and 7 just north of the VC concentration (see map).

The other part of the battalion would be moved by air around the concentration and landed in the south. It would seize objectives 4, 5, and 6, setting up a blocking force. The northern force would then squeeze the VC against the blocking force and eliminate them.

The operation got off to a good start the next morning. The force moving by land crossed the departure line promptly at 0800 hours.

"Ringo" armed platoon was assigned to support this force and flew down to reconnoiter the area. I was flying one of their gun ships, but I had permission to move over to the southern area provided my aircraft was not needed by the Ringo commander.

Ringo's first job was to discover the strength and exact location of the VC, pick out places for the rangers to attack, and decide what routes the VC might use to escape the trap. We planned to seal off these escape routes when the operation started.

At first we couldn't see the VC hidden in the thick vegetation below. We were flying at a rather high altitude and at 80 knots. To get a better look we came down to treetop level and slowed down

Downwash from my rotor blades flattened the rice stalks as I landed

10 knots. At this altitude and speed signs of VC concentration could be seen all over the place.

When the Viet Cong found they had been discovered they opened fire. Immediately one of the Hueys was hit. The pilot turned north, heading away from the thick vegetation. He was looking for a cleared place to land. I decided to escort him down, hoping to get the crew out before the VC could react.

The crippled ship headed for a nearby rice paddy. In its last stage of growth, the rice was very high. When the helicopter settled in, its low silhouette was almost hidden from view.

I landed close by. Downwash from my rotor blades flattened the rice stalks, making a beautifully cleared circle around my helicopter. In a few seconds the crew emerged from the tall rice. They were carrying their weapons and ammunition so the VC couldn't get them.

In a normal operation, if recovery ships can't get in, it is usual to destroy an aircraft when it's down behind enemy lines. This keeps it from getting into enemy hands. But in Vietnam the communists are many miles from home and have no means of transporting large items. For this reason I did not blow up the crippled ship. If the VC discovered it they would do the job for me. If they didn't we might be able to come back and take it to safety.

Removing all arms and ammunition is a must. If these can't be removed quickly then the whole aircraft must be destroyed.

After taking the crew to safety I asked Ringo's permission to go to the southern area of operations. I took a wide detour around the VC concentration to conceal my action.

I got there just in time. In the distance a contingent of 24 heli-

copters came into view, loaded with troops. This was the first lift. Herding them into landing zone 1 was the "Viper" platoon of armed Hueys.

The LZ was typical of the flat marsh country found in southern Vietnam. It was very low—not more than 10 feet above sea level in its highest parts. During the rainy season it probably floods. Right now it was mostly dry with only a few shallow pools scattered around.

The whole area was covered with high marsh grass. Around the outer fringes was a line of low scrub. Past the scrub was the area of thick jungle vegetation the VC had selected as their hiding place.

As the troop ships came in and landed, Viper's armed platoon circled overhead, firing on anything that moved. Some of the gun ships were even firing when nothing moved.

The landed troops encountered no resistance until they were near the low scrub. Then the VC started firing. Viper came in closer and intensified their fire, enabling the rangers to continue moving towards objective 2.

About this time I noticed that one of the Viper craft was in trouble. It had apparently been hit. Feeling quite experienced in this business of rescuing downed crews, I headed in to help.

The crippled ship was settling fast. It still had power but it was apparent the pilot couldn't be choosy about his landing area. He headed north, apparently hoping to clear the fighting area but finally settled in a cleared field within sight of the VC. I landed quickly and the crew of the downed ship ran over to get on board. Before leaving their ship, however, they removed all weapons and ammunition.

Right after we lifted off, a mortar shell exploded close by. In a second another shell landed, this one dead center of the downed Huey. The helicopter caught fire and was completely destroyed.

We made several passes over the nearby jungle but we never could locate the VC mortar. As soon as they had done their dirty work they stopped firing and hid.

By the time we had dropped off our rescued crew and returned to the southern operation area, the troop ships had returned with their second load of rangers. They landed at about the same spot as the first group and encountered no resistance from the VC.

But the communists were by no means keeping quiet. They were concentrating fire on the hated American aircraft. They had somehow decided that the little (radio relay) Bird Dog flying high overhead was important. So they fired on it steadily and managed after many tries to get a hit. At that distance they couldn't do much damage and the little airplane made it back to the nearby airfield. Before it was even out of sight another radio relay ship was coming to replace it.

Some ARVN rangers had been wounded in the fighting. A medevac helicopter came in to take them to the hospital. It was immediately taken under fire and hit. Before it had returned to the landing strip two other helicopter ambulances were replacing it. This time Viper gun ships kept the VC in the immediate area under fire so they couldn't interfere.

After the second lift seven of the troop ships were released. The remaining 17 picked up a third lift and air-landed them to reinforce the first two landings.

While on the ground one helicopter received a hit which caused hydraulic failure. However, it was flown back safely and with minor

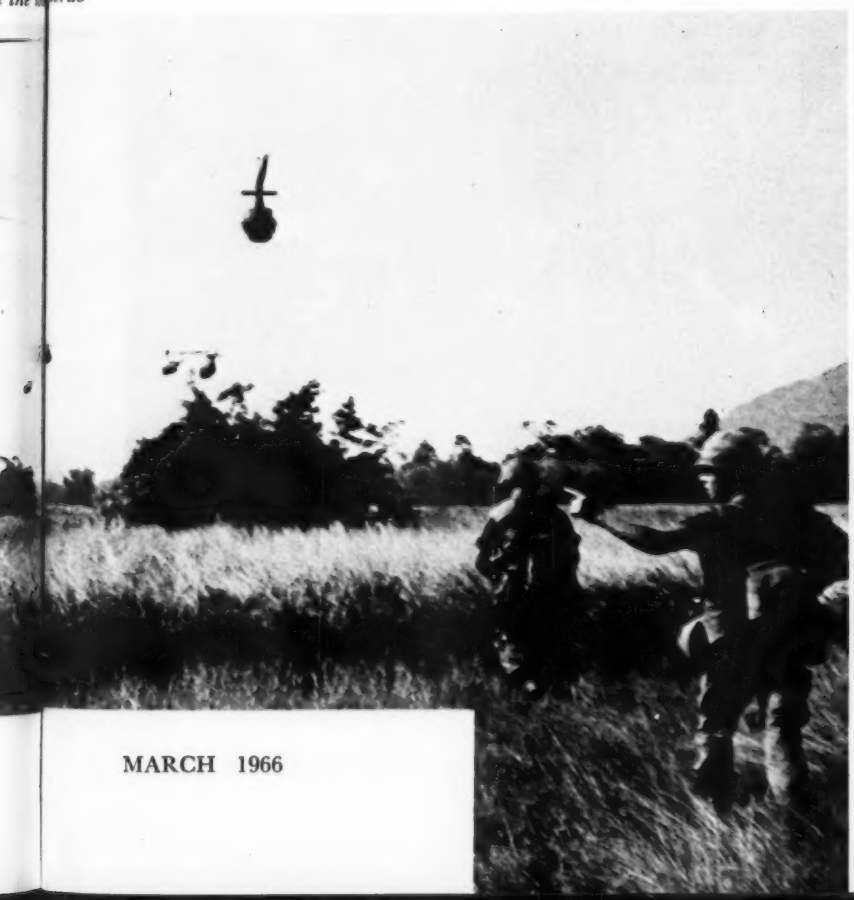
As the troops land (above), Viper's protecting ar *platoo*

Troops met no resistance until they neared the l *scrub*

latoon circles overhead (left)

Photo Courtesy: Military Review

crub



repairs was flying in a few days.

With the landing of the third lift the VC began pulling back. The southern force was able to neutralize objective 4 and seize objectives 5 and 6. The blocking action had begun to take shape.

After the last lift six more Hueys were released. The other 10 remained as standby. The armed aircraft rotated on station to provide continuous suppressive fire for the rangers.

The action seemed to be progressing satisfactorily and the northern force began its push in earnest. As they were closing in on objectives 3 and 7 the VC suddenly opened up with all their weapons. They had consolidated their position and now seemed determined to resist.

In the southern area one corridor was not blocked by ground troops. The gun ships had been watching it, planning to close it if the VC tried to use it as an escape route. But now with increased resistance it was necessary that more gun ships be used to suppress fire and the corridor could not be closed properly with the remaining available helicopters.

The ARVN commander decided to be safe and send a lift of troops in to plug up the area. He asked for troop-carrying helicopters for this purpose.

Ten UH-1Bs that had been on standby picked up the reserve element and landed them at LZ 2. These were the fourth and fifth lifts. Of course they were escorted by armed ships but there was no counteraction by the VC. Upon landing, these troops moved toward objective 8 to tighten the enclosure around the Viet Cong and seal off the last avenue of escape.

In two hours objective 8 had been seized. The northern force entered the dense jungle to mop

up the remaining Viet Cong and seize objectives 9 and 10. The operation was over and all aircraft were released.

The next morning the results were available. Seven ARVN rangers had been killed and 20 wounded. Two American advisors were wounded, and one helicopter was lost. All the wounded men were evacuated by helicopter to the nearest medical facility.

On the other hand the Viet Cong had taken a terrific beating. Some probably escaped in the heavy vegetation but most were killed or captured. The ARVN commander said he counted 51 dead communists at the time of the report and the entire area had not been searched. The PW camp held 61 captive VC and 58 suspects.

Among the equipment captured were two 60-mm mortars, one of which was probably the weapon that destroyed our aircraft. Also captured were 1 BAR, 1 smg, 20 rifles, 5 carbines, 18 60-mm rounds and 50 hand grenades.

We expended 65,000 rounds of 7.62 and 350 2.75-inch rockets.

The old man pointed out in his report that the force airlifted into the blocking position had come as a surprise to the communists. When they selected the jungle as a bivouac area, they apparently planned to retreat south if attacked by the superior force they knew to be a few miles north of them. This would have been possible except that the blocking force got there first. He recommended the use of aircraft to transport troops for such surprise movements.

After the action was completed we turned our attention to the aircraft left in the rice paddy. I was told to lead a repair party and maintenance ship to the helicopter. The old man wanted the rotor blade removed and the crippled ship brought back to the field if possible.

We found the helicopter exactly as we had left it. The repair crew removed the blades, stripped it of excess weight, and the maintenance ship brought it back home.

I rode shotgun but there was nothing for me to do. The Viet Cong had been eliminated.

Med-evac Huey comes in to take wounded to hospital

Off with the Bright...

IN FRONTIER days, Indians used to paint their faces with bright colored paint when they were about to attack white settlers or another Indian tribe. The modern day girl carries on the practice of putting on "war paint" when she decides to take a poor unsuspecting male down the altar trail.

But Army Aviation is different. During periods of relative peace, when the Army is not fighting, Army aircraft put on the brightest paints—olive drab gloss, high visibility red orange, glossy white and black, and bright yellow lettering.

This bright paint is not to impress the civilian population—although it does this too in a way. The main purpose of bright paint is so Army aircraft can be better seen by the many other aircraft in the air.

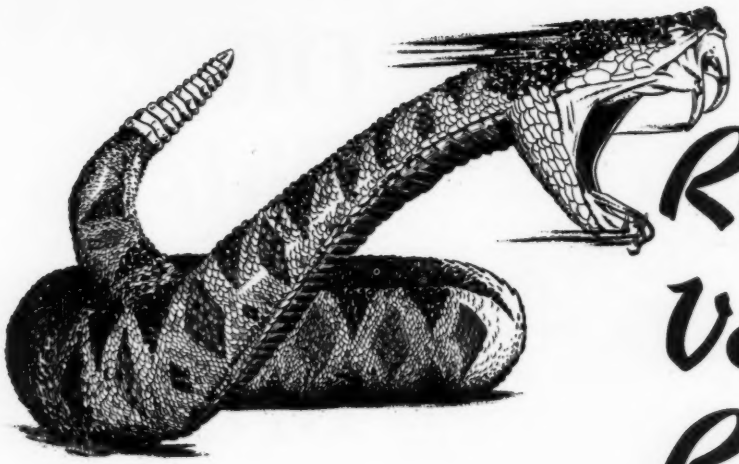
But when the Army goes into action this bright paint becomes a liability. It is removed and the dull paint goes on. The aircraft can't be seen easily and the operational life of the vehicle is extended.

With Army Aviation so active in Vietnam, the Army has decided that it's time to take off the bright paint and put on the dull. All Army CONUS aircraft are gradually being painted with lusterless olive drab paint. New aircraft coming from the factories are being painted with the lusterless olive drab. Army aircraft in Vietnam have been using the dull paint scheme for some time. Other overseas commands are being asked to do the same.

In the new paint scheme, the national insignia is removed and the identifying "Army" or "U. S. Army" is dropped from tail rotor pylons, vertical stabilizers and wings. All other numbers and other lettering is in black lusterless paint. The only bright paint is a 1-inch yellow band around emergency exits.

Training aircraft and those operating in the arctic continue to use bright colors as in the past.

On with the Dull



Captain Frederick N. Olson
and Captain H. W. Posey

Rattling Venomous Reptile

YOU HAVE just contacted approach control on an IFR flight to Atlanta, Ga. The weather is reported to be 300 feet overcast and ¼ mile visibility, RVR 28.

1. If you are equipped with a full component ILS, can you make an approach?
2. If you make the approach and do not break out of the clouds or gain visual contact, to what altitude may you descend?

The weather is now reported to be 400 feet overcast and ¾ mile visibility, RVR 24.

3. Can you make an approach?
4. If you are not equipped with a glide scope receiver, can you make an approach? (Answers can be found at end of article.)

If you are not sure of the answers to these questions, this flight could become a RATTLING experience. If you guessed the answers and guessed wrong, this flight could become as deadly as the most VENOMOUS REPTILE. Persons who thoroughly understand reptiles can handle them with confidence. If you understand RVR, you can handle it with confidence.

What are RVV and RVR?

RVV (Runway Visibility Value) is the visibility along an identified runway measured by an instrument or by a human observer. Reported in fractions of a mile, it represents the distance at which a dark object can be seen against the horizon during daylight, and at which a 25 candlepower light can be seen during darkness.

RVR (Runway Visual Range) represents the horizontal distance a pilot will be able to see down the specified runway from the approach end. Determined by instruments it is based on the sighting of high-intensity runway lights

SCHEDULED AIR CARRIERS & PVT OPERATORS STRAIGHT-IN RWY 9L			NON-SCHED AIR CARRIER STRAIGHT-IN RWY 9L	
ILS	G/S ONLY OUT	LOC & OM	ILS	COMP/S OUT
(1)	(1)		S	S
200–1/2	300–3/4	400–3/4	300–3/4	400-1
			S	S
or	or	or	or	or
RVR 24	RVR 40	RVR 40	RVR 40	RVR 50

(1) NOTE: Private operators 300–3/4, RVR 40

or on the visual contact of other targets, whichever yields the greatest visual range. The intensity of runway lights is controllable. Therefore, the RVR readout is increased by the increased intensity of the runway lights. This is the primary advantage of an RVR reading as opposed to an RVV reading. By taking into account the penetrating capability of the high-intensity lights, an RVR reading represents a more realistic and accurate indication of what the aviator will actually see when on the runway.

Runway Visual Range is reported in hundreds of feet. To substitute an RVR value for visibility, a pilot must know its mileage equivalent. RVR values and mileage equivalents are given below:

RVR	MILEAGE EQUIVALENT
2,400 feet or RVR 24	½ mile
4,000 feet or RVR 40	¾ mile
5,000 feet or RVR 50	1 mile
6,000 feet or RVR 60	1¼ mile

Who may use Runway Visibility Range? All instrument rated aviators may use RVR, except that holders of fixed wing standard instrument cards may not use RVR when using scheduled air carrier minimums.

When may RVR or RVV values be substituted for prevailing visibility?

Whenever visibility is reported as an RVR or RVV for the runway to which an approach is being made, this visibility value will control the approach. This also applies to takeoff. Therefore, when RVR or RVV is reported for the runway to which an approach is being made or from which a takeoff is being made, all aviators will substitute this value for the prevailing visibility.

For example, you are planning to make a VOR approach with published minimums of 400-1. Weather is reported to be 400-¾ with RVV reported as 1 mile. The RVV would control and the approach could be made. On the other hand, let's imagine you are planning to make an ILS approach with published minimums of 300-¾ and RVR is reported as 2,400. In this case you could not make the approach because the RVR value is less than the visibility minimum for the approach. However, if an RVR or RVV value is not available for that particular runway, ceiling and prevailing visibility minimums govern.

When may RVV or RVR be substituted for ceiling and visibility?

RVV may never be substituted for ceiling and visibility. It may be substituted for visibility only.

RVR may be substituted for ceiling and visibility for straight-in PAR and ILS approaches when RVR minimums are published for the approach and the reported RVR value equals or exceeds the published minimum. In such a case, an aviator may make the approach to the published ceiling minimums and complete the approach if he then has the lights in sight or is clear of the clouds.

For example, the ILS minimums at Dannelly Field, Montgomery, Ala., Runway 9, are 200-½, RVR 24. The weather is reported to be 100 feet overcast, ¼ mile visibility and RVR 24. The aviator may start the approach and descend to 200 feet. If he has the lights in sight or is clear of the clouds, he may complete the approach; otherwise he must execute a missed approach.

On other approaches (ASR, VOR & ADF) RVR may be substituted for visibility only.

For RVR to be used as a sole minimum on an ILS approach, the following aids and related airborne equipment must be in satisfactory operating condition:

- ILS localizer plus OM or LOM.
- Standard approach light system and condensor discharge lights.
- All-weather runway marking or centerline runway lights.
- High intensity runway lights.

Why is it important for instrument rated Army Aviators to understand RVV and RVR?

RVV and RVR represent visibility along a particular runway. Frequently visibility along any particular runway will be either more or less than prevailing visibility. Since instrument approaches are not made to the entire airport area, it is obvious that visibility along the approach runway is of greatest interest to the pilot.

Where RVR is published as a sole minimum, approaches can be made in weather that would otherwise be prohibited. Furthermore, it is presently planned that RVR equipment will eventually serve each runway equipped with an instrument landing system.

Military aviators are expected to possess the highest degree of professionalism. To maintain this respected position, it is essential that we have a thorough knowledge of the equipment and procedures now being used in aviation.

Answers to questions:

1. R/W standard, R/W special—yes. F/W special—yes; F/W standard—no.
2. For holder of R/W standard, R/W special, and F/W special, 200 feet. For holder of F/W standard, no approach.
3. Same as answer #1.
4. No.

Capts Olson and Posey are with the Department of Rotary Wing Tng, USAAVNS, Ft Rucker, Ala.

LETTERS

Continued from page 1

page 25? Newspapers do this to get people to turn to the pages with the advertisements but this obviously does not apply in our case. . . . Just a nit-pick for what it's worth.

CAPT JAMES M. STURGEON
Tng Off, Libby AAF
Fort Huachuca, Ariz. 85613

Sir:

I'm not an aviator but do, on occasion, read the Digest. Permit me to say I think you are missing the boat with a lot of people in the Army.

We aren't being advised of all the potential in aircraft use. Let me illustrate:

This past summer I put in two weeks evaluation duty at Camp Pickett evaluating some Ordnance Units, both Reserve and National Guard. One unit's camouflage discipline was rather bad and the thought occurred to me that a flyover of the area for officers and key NCOs in the unit would be informative. Believe me it was!

A small point perhaps, but I'll bet there are NCOs and officers with 20 years behind them who have never had the opportunity to check themselves out on their camouflage. The airplane drivers are over units every day but how many of you have assisted the gravel pounders—but more importantly—tech service units in this one survival item?

I'm sure you can come up with many other items along this same line.

MAJ BERNARD M. SIEVERS
Hq & Hq Co, 2d Log Cmd
APO San Francisco 96248

• *We invite comments in the form of an article from "gravel pounders" and "tech services." How about it?—Ed*

Sir:

By courtesy of the Army Aviation Advisor, MAAG, Germany, I receive regularly a copy of the Aviation Digest. Being one of the first three German student officers who arrived at Fort Rucker on January 1, 1956, to receive their helicopter training I am always looking forward for my monthly copy because the articles are not only interesting but written with great skill and in a professional manner, especially the ones dealing with flight safety, accident prevention, etc. So, in reading my December 1965 copy I was really glad to meet good old Capt Horatio Frozzleforth again. By his way of flying I was a bit afraid it had been the late Horatio Frozzleforth but I am happy to see him "still going strong." May I wish him good luck, even if he doesn't deserve it, he really needs it, if he is planning to draw his flight pay any longer.

At the conclusion of this letter may I be allowed to make a suggestion:

Why not compile the stories of Horatio Frozzleforth into a little booklet and give to all pilots at their graduation?

I am sure it will not only be a souvenir of the time he was working hard to become a skillful, proficient and thoughtful pilot but besides the fun of reading or rereading about Horatio sometimes it may call to his attention the fact that he too occasionally has been sloppy, careless or overconfident. That certainly will make him think and remember him of the way this flying should be done, which maybe one day could save his life and, even more important, the lives of others who trust him. And that will be the true justification and reason to keep old Frozzleforth alive for the benefit of all the other aviators.

MAJ PETER H. NOLTE
German Army Aviation
Truppenamt, InHRust
5 Koln
Bruhler Str. 300
Germany

Dear Major Nolte:

Have no fear! Frozzleforth is here! Your letter to the Editor-in-Chief of the U. S. ARMY AVIATION DIGEST reached me just as I finished testifying before a Flight Evaluation Board.

Can you imagine it? They were actually thinking about grounding the world's greatest aviator! I'm happy to report that your testimonial helped to sway the board in my favor. Many thanks!

Unfortunately, after my last accident, neither the investigation board nor the experts in the laboratory could determine what malfunction or failure caused the aircraft to exhaust its fuel. I guess we'll just have to chalk it up as undetermined. You'd think those chaps could do a better job with all the scientific gadgets they have these days!

I think your suggestion about publishing my memoirs for young aviators is excellent. What better way could they learn the finer points of flying? As soon as my busy schedule permits, I'll dash off a few more thousand words of wisdom and have my agent approach the publishers.

At present, I am temporarily assigned to the U. S. Army Board for Aviation Accident Research while the Officers Assignment Division seeks a post worthy of my talents. As you can well imagine, many Army commanders are battling for my services. I may decide to accept a position in Vietnam if it offers a genuine challenge to my flying ability.

Meanwhile, cheers, and

Best wishes,
HORATIO FROZZLEFORTH
Captain
World's Greatest Aviator

Sir:

I enjoyed your December issue of the Digest as I have each previous issue for the past several years. Captain Lawson's article "Know Before You Go" is of particular interest to me. It is indeed an interesting and thought provoking article. However, I feel there are a couple of mistakes in it which need correcting.

On page 14 Captain Lawson states: "The B-12 back-type parachute is used in most Army aircraft for emergency jumping." The fact is very few Army aircraft carry parachutes of any type. In practice major commanders take full advantage of their prerogative to waive parachute requirements in aircraft under their commands, which is in accordance with AR 95-1, p. 11. A check of TOE 1-55F and TOE 1-75E indicates divisional aviation units aren't even issued parachutes.

This statement also tends to infer that "emergency jumping" is commonplace. I'm sure a check of the records at USABAAR will reflect very few emergency jumps in the past several years.

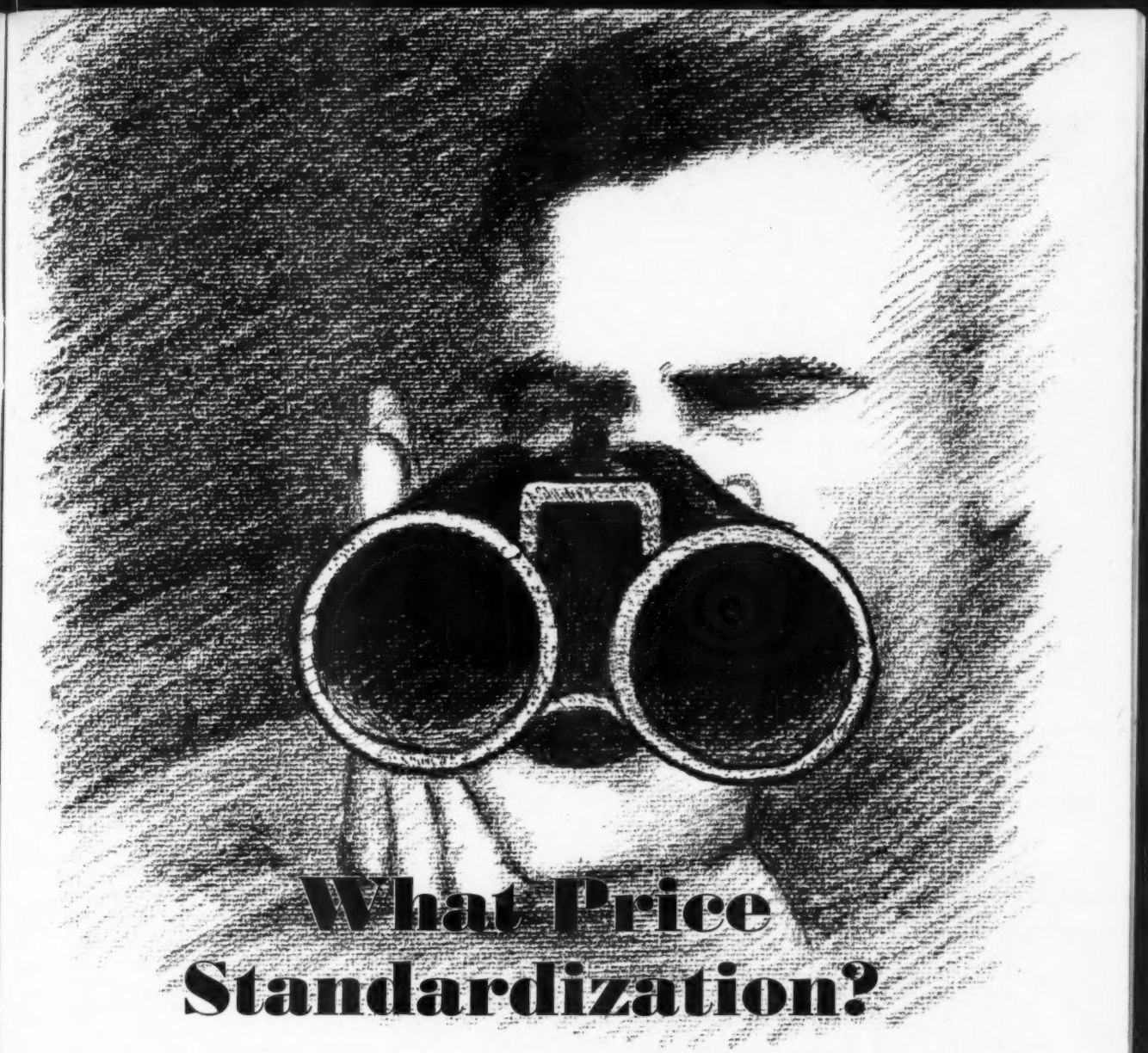
The article continues on p. 14 with a parachute inspection checklist which is outdated and inaccurate, i.e., B-12 parachutes are now repacked every 120 days and routinely inspected every 30 days. The correct checklist is found in *TB 10-1600-200-20/1, Routine Inspection of Parachutes,* dated 8 December 1964.

CAPT GEQRGE R. CATRON
Off Stu Det
USATSCH
Fort Eustis, Va. 23604

Sir:

Let's be done with it! A clear victory can never be won and I don't like this wandering around wondering when we're going to be hit next and from which direction. It ain't worth it. Resistance is widespread and throughout the world, overt and hidden in the deepest recesses. It insidiously creeps into every organization, eventually leaving us barren and without. The enemy is everywhere. Let's be rid of it. Stop the fight and resign ourselves to the fate which is inevitable. Let's take the disputed thing and laterally transfer it back to from whence it came. They started the whole darn thing anyway. Why did they let us have it in the first place? Obviously it was to promote dissension among the group and keep us off balance. CURSES! Would that it could never have been invented. I wish I'd never seen one! I wish they'd never made one!! I never want to see one again!!! Take the blasted flight suit, and . . . and . . . and . . . give it back to the Air Force!!!! Yiiiiiiiiiii.

MAJ STEPHEN FARISH
54th Avn Co. (AirMb1FW)
APO San Francisco 96291



What Price Standardization?

Captain William E. Volk and Lieutenant Jack B. Sutton

MAJOR DOBOY had had a typical day of operations in the Mekong Delta. His airmobile company (light) had made a successful troop lift that morning with no rounds taken. He credited much of the success to his armed platoon. Their eight Hueys had done a fine job in engaging two en route targets and softening up the LZ.

The major had monitored Lieutenant Firebird's fire commands that Saturday morning. Lieutenant Firebird had used informal commands on all the targets. A couple of commands had been "Fire team Blue, get those VC in the rice paddy to your left front" and "The LZ is dead ahead; go ahead with your prestrike." These commands followed the pattern that Lieutenant Firebird had worked up, but what were the other armed platoons in the combat zone using? Each unit seemed to have its own SOP for engaging

Standardized fire commands for all echelons of command in the combat zone would enhance mission accomplishment

targets and issuing fire commands, and each was a little different.

After mulling the day's mission over, the major decided to call in Lieutenant Firebird and Captain Fearless (op officer). They all went to see the S-3 for a conference on standardizing fire commands for all units in the combat zone. Suggestions were solicited from other units and the staffing was underway.

The final product on paper consisted of six elements: three mandatory and three optional. Alert, target description and target direction, and range would be the mandatory elements. Direction of attack and break, marking the target and report, and remarks would be the optional elements.

Alert was selected in lieu of warning order. With the furious pace of aerial gunnery target se-

Capt Volk and Lt Sutton are with the Rotary Wing Intermediate Maintenance Division, Dept of Maintenance, Ft Rucker, Ala.

lection being the rule more often than the exception, it just didn't seem feasible to wait for "Send your mission." This element included the call sign of the person ordering the fire mission and the call sign of the person to whom the mission is assigned.

Target description followed the tried and proved methods of the combat arms. Personnel targets would be reported in number of personnel and not squad, platoon, company, etc. (How many men are in an enemy platoon or company?) Any fortifications observed would be reported here. If equipment other than small arms is in the target area, report what type (artillery piece, 50 caliber machineguns, armored personnel carrier, etc.)

Target direction and range was to be given in relation to the attacking aircraft at the time the fire command is sent. Target direction would be the clock system for simplicity and expediency. Target range would be given to the nearest quarter mile due to the apparent speed of aircraft.

If given, the direction of attack would be direction TO the target on final approach. If this element is omitted, the attacking echelon commander will exercise his judgment in approaching the target area and breaking away.

It is apparent that a target need not be marked after a salvo run. If a target was to be marked, the sender would specify how it should be done. If "report to" is omitted, it is understood that the attacking echelon will send the aftermission report to the sender.

Remarks will cover any additional instructions not given elsewhere in the command. Some examples suggested were: Save half your ammo, join another platoon after attack, stand by for additional fire commands, report remaining fuel and ammo, return for fuel and ammo resupply and report return when 2 minutes out. This section would also allow the individual commanders the flexibility of issuing orders most familiar to his aviators while in a combined aerial assault.

The fire command format was drafted and distributed to aviators and gunners. The S-3 had scheduled four Hueys for weapons firing on the range and the stage was set for the ever important step from paper to operation.

Briefing was conducted at 0600. Takeoff would be at 0730 with the S-3 piloting a Bird Dog and Major Doboy riding as observer with call sign Blue 1. Captain Fearless had call sign Red 1 and Lieutenant Firebird was Red 2. Each was a fire team leader with two Hueys.

The S-3 had set up simulated personnel targets en route to the gunnery range. When the first personnel target appeared, the operation was underway. Major Doboy sent his fire command: Red 1, Blue 1, fire command. Ten troops in rice paddy; 2 o'clock, 3 miles. Attack south, break left; blue smoke. Join Red 2 after one pass.

Red 1 sighted the target and immediately set up his pattern for attack. The attack was made and a blue smoke grenade dropped. He then joined Red 2 and sent his aftermission report.

Targets on the gunnery range were in sight now. The S-3 had placed them along a treeline. Major Doboy purposely steered Red 1 and 2 abreast of the targets. Now to check reaction time with the mandatory elements only. The fire command was sent: Red 1 and 2, Blue 1, fire command. Twenty troops in treeline; 3 o'clock from Red 1, 3½ miles. Attack now. (It had been determined that the prowords ATTACK NOW would be used in the event that some elements were omitted from the fire command). It was now up to the attacking echelon to engage the target in the most feasible manner. They came out of the sun.

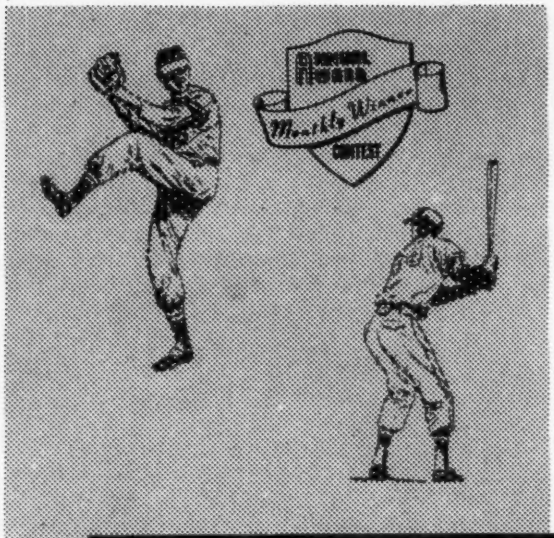
Now for a final check. Immediately after the fire teams pulled up from the target run, Major Doboy sent another fire command: Red 2, Blue 1, fire command. Estimate ten troops still firing; same location. Report ammo remaining after attack. Attack now.

Red 2 engaged the target again and sent his aftermission report including the amount of ammo remaining.

All seemed to go well on the firing range. Now back to the hooch to discuss the feasibility of this fire command format for standardization in the entire combat zone. Many questions came up in the hooch. With a little practice, would it take any longer to send or receive this standardized fire command than it would to use a more informal and individual unit procedure? Couldn't this same fire command be used through all echelons of command (airmobile force commander to platoon leader, airmobile company commander to fire team leader, etc.)?

Would it assist or hinder communications procedures? How many personnel and how much time would be involved in training aviators and gunners to receive and send this command? Should any element be added or omitted? Wouldn't each aviator and gunner in a 100 ship assault know what to expect when a fire command is sent? How well will it work in the heat of battle? These questions had to be answered if standardization was to be implemented.

The Suppressive Fire Branch of the Department of Tactics, USAAVNS, Fort Rucker, Ala., is adopting this fire command for use in training aviators in aerial gunnery.



This nuts and bolts outline for company level intelligence will help your team win a lot of games

No Runs No Hits No Errors

Lieutenant Colonel Patrick N. Delavan

COMMANDING an aviation company in combat is similar to managing a baseball team. Each mission, like each game, is important, but success is determined by the total wins during the season. The most effective way to keep the opponent's hits and runs to a minimum is through company level combat intelligence.

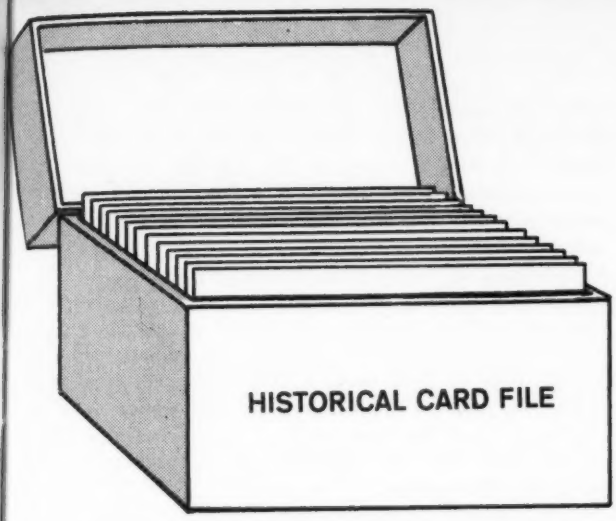
The first problem is to find a good pitcher. Proper selection of an intelligence officer will give you many carefree hours in the club to devote to improving the company's morale. In fact, the club is the best place to start looking. The extrovert, regardless of rank, who imposes his will on the group and generally leads the festivities is the character you want. Next you need a Pfc or Sp/4 who will methodically copy and file information. He is going to be your highly mobile, self-contained automatic data processing machine. The first sergeant usually has two or three of these types earmarked and held in reserve in case his clerk gets sick. Now you need an intelligence sergeant. His qualifications need to be those inherent to his rank, plus willingness to put in long hours and see that the clerk does the work.

That is the pitching staff. Here are the tools they need to do their work.

The intelligence section needs an office that can be secured. As a minimum they should have part of the operations office with wall space for two maps. This office should be convenient to pilots when they are getting ready for a mission. You want every aviator to become interested in your maps and get in the habit of checking them before each mission.

Another essential tool is the historical card file. The clerk will be primarily responsible for this file which will have a card for each grid square on the map for your area of operation. This card file is the backbone of your system because enemy information will come to you on a daily and weekly basis. Unless you establish a historical record of activity in a given area you will find that you are reacting to a threat after the fact. Also when a record of enemy activity builds up in an area you can be relatively sure that the threat will be constant.

Thus the cards should contain identification of enemy units and date reported in that grid square and location of any installation such as training areas, hospitals, etc. When you have built a background on these cards, you can determine an



enemy's area of operation and movements. For instance, in Vietnam anytime an aviation company operated west of My Tho they would run into elements of the 514th Battalion. This battalion had a characteristic way of fighting, and special precautions were necessary.

The primary source of information for the historical card file is the Intelligence Summaries. These ISUMs will contain a lot of information that is not applicable to the aviation unit. The intelligence officer must read through each of these and check those items he feels should be transferred to the card file. The clerk can then abbreviate the entry and record it on the appropriate card.

ISUMs should be available through normal channels. If you are not included in normal distribution, get on your horse and fight until you get an orderly flow of ISUMs. Every theatre has these though to get them sometimes requires rattling the boxes of higher headquarters. But when you show any intelligence type that you are interested in his business, he will clasp you to his bosom and flood you with information.

Tool three, the situation map, is the responsibility of the intelligence sergeant. It should show the last reported location of known enemy units, using the conventional map symbol, and be dated, using the day/month method. The map should also show spot locations of known antiaircraft weapons.

Adjacent to the situation map should be the flight route planning map. This is one of the best tools you have to reduce the number of hits your company will take, and should be the same scale as the situation map. Each grid square will be broken into four parts and will be coded with colored pencil. The system as once used in Vietnam was:

Black—no fly area
Red—ground fire received in the last 30 days
Yellow—units located here have capability to deliver ground fire
Clear—no fire in the last 30 days and no known units in the area.

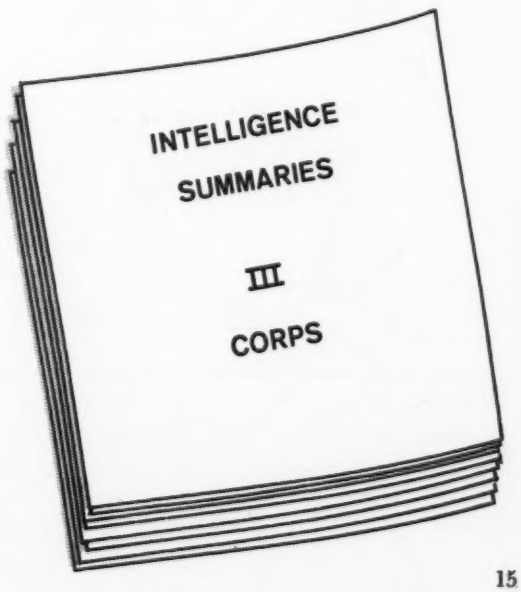
This map should be reviewed and the squares regraded once a month. The individual squares will be continuously upgraded from yellow to red, etc., as ground fire is reported by your crews. Thus you will be able, at a glance, to plan the safest flight route from point A to point B by looking at the red and black checkerboards on this map.

Next, the intelligence officer needs an order of battle book. This will contain strengths and weapons for each known enemy unit. Regrettably, you may have to chase this book down like you did the ISUMs.

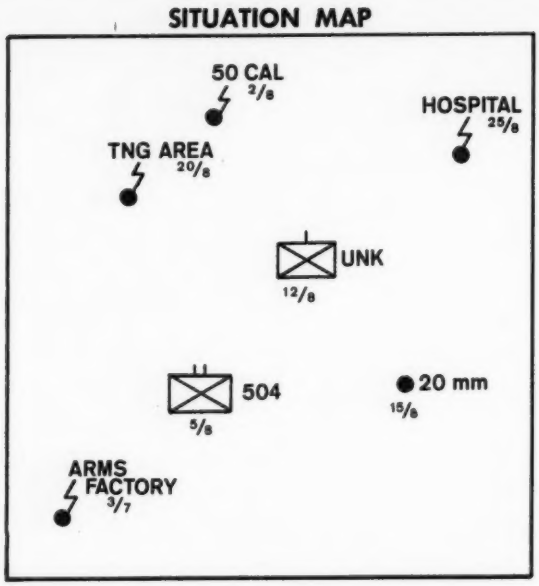
These five items (tools) are the nuts-and-bolts hardware of company level intelligence. Here is the method of putting the system in motion.

Have the intelligence officer go through all the old ISUMs he can find. He will use his judgment on items that pertain to aviation, and the clerk posts each of the checked entries to the historical card file in chronological order.

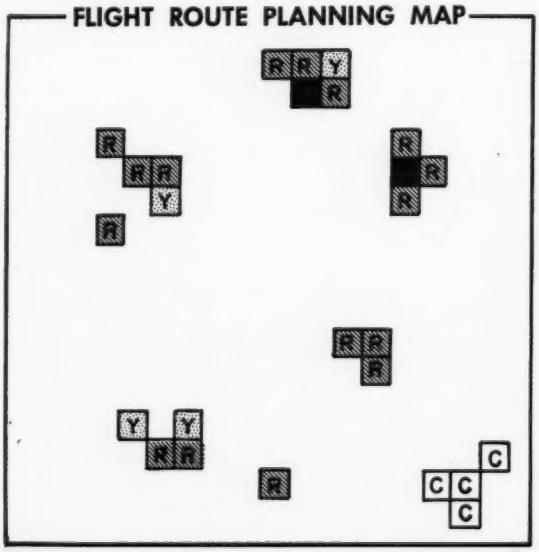
Enemy units reported in the last 30 days should be posted to the situation map. Initially, enemy ground fire information may be difficult to find. If your unit is new in the theatre, the intelligence



Col Delavan is with the Combat Developments Command Special Warfare and Civil Affairs Group, Ft Belvoir, Va.



officer can go to other companies and record their information. Often pilots who have been in the country a while will have a clear idea of where hot areas are located but the information may not have been recorded in any useable form. To start the system you may have to rely on these "war stories."



Black—no fly area

Red—ground fire received in the last 30 days

Yellow—units located here that have capability to deliver ground fire

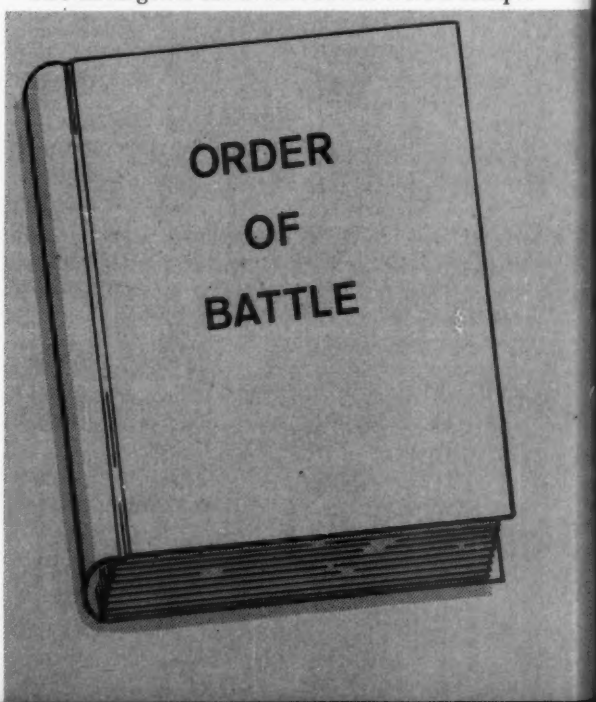
Clear—no fire in last 30 days and no known units in the area

Debriefing aircraft crews is the most important source of current information you have. This is the main area where, as company commander, you may be required to exert your influence. It must be made absolutely clear to the intelligence officer, the operations officer, and the crews that a debriefing will be held after every mission. An exhausted, hungry crew at 2100 hours is less than a cooperative group. But if you let them wait until tomorrow you have sown the first seeds of failure for your system. Soon the hit rate will go up and your problems will increase.

The best way to handle this debriefing is to have the mission leader designate one of his pilots at the beginning of the mission to gather information during the flight. Keep in mind, the advisors in the field are an excellent source of information. Often they will tell you things that don't get in ISUMs and their information will be the most current in the theatre. Also, administrative flights, where there are frequent stops at outposts, etc., are valuable sources of information. The pilot designated by the flight leader should milk them for all they are worth.

Then the intelligence officer takes all of this information and uses his judgment about what should be recorded in the historical file, flight route map or situation map. Most important, he stores this information in his brain and it helps him make a judgment for his briefings.

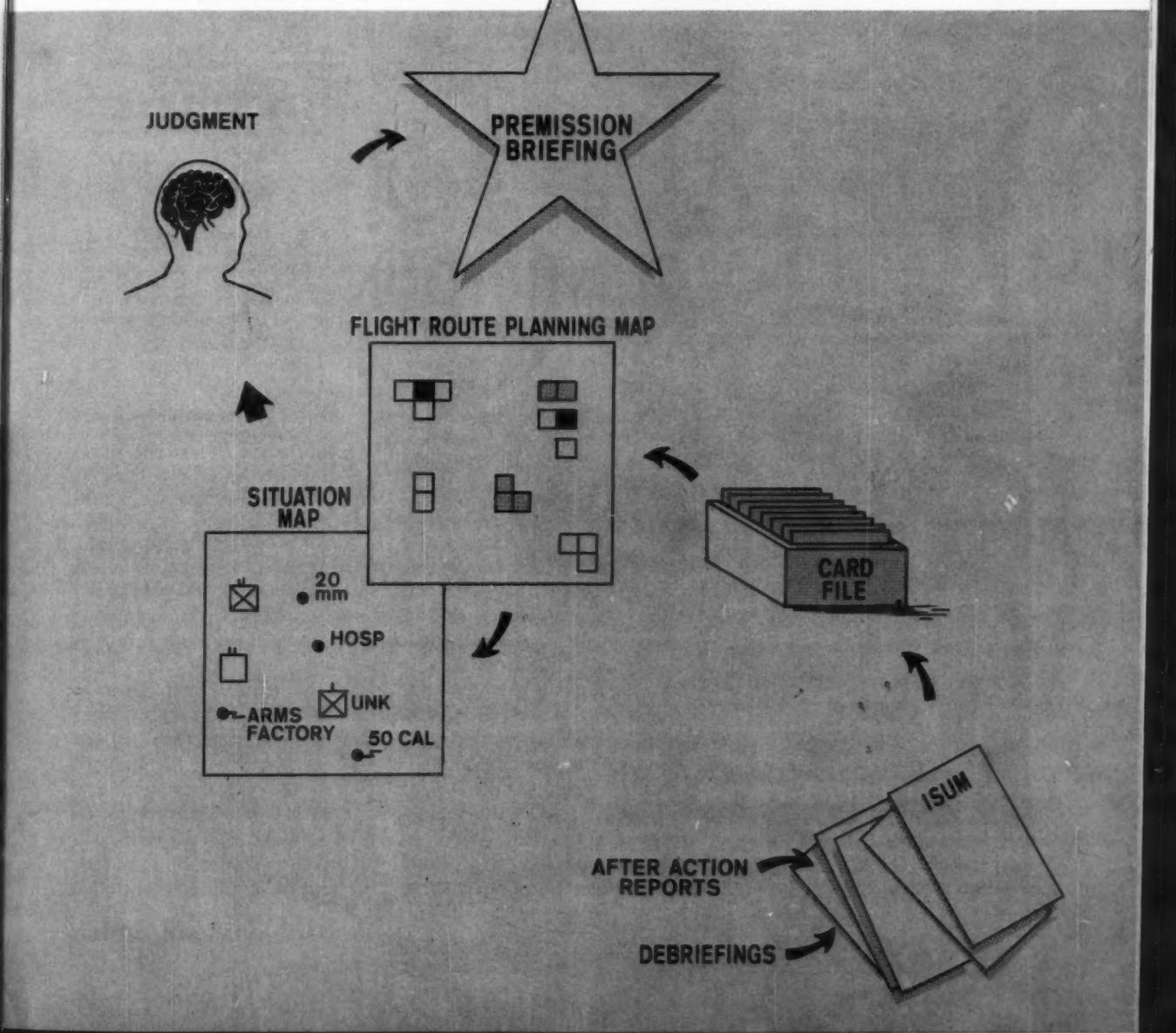
The intelligence officer should also have a cockpit



seat on as many missions as he can stand. He should be a frequent visitor to supported units; it's amazing how much the ground units know about the enemy that doesn't get into reports. Face-to-face contact gives openings for G-2s and S-2s to voice their opinions. In Vietnam these guys were 90 percent right in what they thought but woefully less accurate in what finally was written and submitted through channels. Before every airmobile assault, personal contact must be established with the supported unit.

From all of these resources the intelligence officer gathers the necessary means to make a valued judgment in the premission briefing. You must ensure that a thorough briefing is conducted before each mission. The five-paragraph field order is still the best way of conducting a briefing, and the intelligence officer should give paragraph one of the briefing. This is the culmination of all his work and the main reason he exists.

We have discussed a simple method of focusing the intelligence workload on a minimum of your command. The five tools: historical file, situation map, flight-route map, ISUM file, and order-of-battle handbook are easily understood. The judgment of your intelligence officer and the command emphasis that you place on the system will determine whether you win a pennant or merely become one of the also-played.



KA-60 CAMERA

ONE OF THE principal missions of the famed World War I "Flying Coffins" was to take aerial photographs. These airplanes got their nicknames because they had the nasty habit of catching fire when an enemy bullet entered the fuselage. (There was a serious design fault in the fuel system.)

Despite this drawback, they were good platforms for cameras; they made possible the development of aerial photography as a principal source of information for military intelligence.

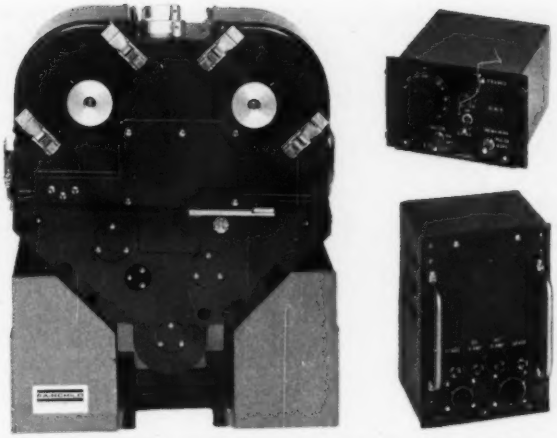
Today aerial photographs are a very important source of military information. The U. S. Army has spent much time and effort in developing the surveillance systems that go into its aircraft. Latest of these is the KA-60 forward looking 70 mm panoramic camera system. Installed in the OV-1 observation aircraft, the KA-60 is now being used in Vietnam. It should be noted that this camera will not replace the current KA-30 camera in Vietnam but will supplement it in order to improve the Mohawk's effectiveness as an aerial surveillance platform.

Heart of the system is an electronically controlled lightweight camera which provides horizon-to-horizon coverage. This wide coverage is made possible by a double dove scanning prism rotating in front of the lens. The camera also has a fore and aft scan ability that can be used for damage assessment, pathfinding, etc.

The KA-60 is designed to take up to 12 pictures a second, but in the Mohawk the number has been limited to 2 or 4 a second. At 1,000 feet altitude the system has a 60 mile range.

A good feature of the camera is its ability to take photographs in various light conditions. It can even take pictures in the predawn or postdusk periods of dimness or over snow-covered terrain that reflects sunlight. The camera has an automatic exposure control assembly consisting of self-controlled

Above: Lawson Army Airfield, Fort Benning, Ga., is seen in photo taken with the KA-60. The camera gives an extreme, wide angle view with 350 percent greater coverage than is obtainable with a frame camera.



KA-60 panoramic surveillance system camera with cockpit control panel (top right) and control unit (bottom right)

Right: A look under the raised nose cone shows the KA-60 and its support structure. The camera is angled down 20° from the airplane longitudinal axis. The support structure swings down to aid loading and unloading film.

Below: Peering through a V-shaped window the rotating prism allows the camera to take 180° scan photographs.

light sensor and servo controlled shutter and diaphragm.

Enough film fits into the camera to take 300 frames. Unloading and reloading take only a few minutes. The film magazine is attached with quick disconnect clamps, and the support structure used to hold the camera swings down to facilitate loading and unloading. Film comes in 100 and 250 foot rolls and requires Kodak Plus X Aerecon perforated film. An aero exposure index of 80 is used.

Film may be developed using ordinary equipment by any Signal Corps photographic unit. However, high speed developers especially designed to match the system are available. This special process is called "Poro Mat." The process uses a presaturated mat which is squeezed against the film for developing and fixing. The method is almost foolproof, as the developing and fixing is done automatically and does not require darkrooms and developing pans.

Developing and fixing may be done on the ground after the aircraft has landed or in the air while the pictures are being made. When the film is developed on the ground by the Poro Mat process,

Another photograph taken with the KA-60. This is the Verrazano Narrows Bridge between Staten Island and Brooklyn. The picture was taken at 1,000 feet and includes Fort Wadsworth and Staten Island on the left and Fort Hamilton on the right.

Opposite page: New York World's Fair grounds and surrounding network of new highways are shown in 180° scan photo taken during flight test of KA-60 (F-415G) 70 mm surveillance camera. Taken at 1,000 feet, the wide angle forward oblique view includes the entire Fair complex. Tactical value of such photographs is obvious. Photo covers areas from Kennedy International Airport to Whitestone Bridge.

TECHNICAL CHARACTERISTICS KA-60 CAMERA	
Type	Reconnaissance, panoramic, rotary prism
Coverage	180° lateral; 40° fore and aft
Mode of Operation	Autocycle or pulse
Cycle Rate	1 - 12 cycles/sec (autocycle)
	Below 1 cycle/sec (pulse)
Lens	3 in f/2.8 T/3.3
Format	2 1/4 in x 10 in
Film Capacity	250 ft x 70 mm
Exposure time	1/100 - 1/10,000 sec
Exposure control	Automatic, self-contained
Image motion compensation	Optional
Resolution	45 lines/mm LWAR
Data recording	Provision for data annotation
Size (nominal)	13 4/5" (H) x 13 3/5" (W) x 6 2/5" (L)
Weight	26 lbs
Power	28 V DC
	115 V AC, 400 cps

negatives are available in 5 minutes and enlarged prints can be ready in 6 minutes.

To develop the film in the air a special inflight cassette is attached to the camera. The Poro Mat web is mated with the film and developing and fixing is done as fast as the pictures are taken.

The operator may operate the camera by autocycle or by pulse. In the autocycle method the camera takes a number of pictures per second as desired. In the pulse method an intervalometer is set for an infinite range of overlapping. In addition a special button allows the operator to take extra frames as desired without interfering with the other systems.

To accommodate the KA-60, the nose of the Mohawk must be modified. Armor plating is removed and the flak curtain reinstalled. Camera and support structure are placed behind a special cowling, and the rotating prism lens peers through a V-shaped window. The camera is angled down 20° from the airplane's longitudinal axis. The support structure weighs 18 pounds and the camera 26 pounds, making the system weight 44 pounds. If the Poro Mat developer is included, there is an additional 10 pounds.

New Enlisted Aviation MOS

Captain Gerald E. Lethcoe

YOU'RE WAY behind times if you still refer to that CH-37 crewchief as a 677.10. Under the converted MOS system this man is now a 67T20. Change 15 to AR 611-201, "Manual of Enlisted Military Occupational Specialities," called for all active duty enlisted men to convert to the new five-character MOS structure between 1 through 25 July 1965. Propay tests in the new codes started in August.

One of the advantages of the conversion is that the new structure reduced the number of MOSs from 1350 to 950. Awarding skill level digits independent of the individual's promotion skill will be a great improvement for enlisted careerists. Under this program it would be possible for a Pfc to hold as high as a 5 level skill digit.

The new code retains the simple five-character structure but eliminates the decimal point and uses letter replacements in the third and fifth positions. For example, the old MOS 676.60 staff sergeant in CH-21 is now 67S40.

The first character (number) represents the broad occupational area into which military jobs are classified. In combination with the first, the second character (number) identifies a career group. The third character (letter) identifies the specific military occupational specialty without regard to level of skill. In this position, A identifies the entry MOS with progressive alphabetical designations for more advanced skills.

Skill level within the MOS is identified by the fourth character. These levels are designated by the following numbers:

1—Apprentice (normally private and Pfc)
2—Journeyman (specialist)
3—Advanced journeyman (specialist)
4—Leader (any NCO E-7 or below)
5—Supervisor (E-8 or E-9)

Under this new system the highest skill level to be awarded a specialist will be advanced journeyman, and all noncommissioned officers will be leaders or supervisors. An NCO cannot hold a specialist MOS, but a specialist can hold an NCO's MOS as secondary.

Fifth character of the code identifies special qualifications. In

ELEMENTS OF MOS CODE	6	7	S	4	H
	1st character	2nd character	3rd character	4th character	5th character
	(numeric)	(numeric)	(alpha)	(numeric)	(alpha)
OCCUPATIONAL AREA	INITIAL CLASSIFICATION				
CAREER GROUP	CAREER GROUP IDENTIFICATION				
MOS	SPECIALTY IDENTIFICATION				
SKILL LEVEL	IDENTIFICATION OF LEVELS OF SPECIALIZATION AND LEADERSHIP				
SPECIAL QUALIFICATION	IDENTIFICATION OF PARACHUTISTS, SPECIAL FORCES, INSTRUCTORS, LINGUISTS, Etc.				

most instances the MOS codes are filled out to include O in the last code position. However, in converting MOS codes for positions or individuals, this position should be changed to a special qualification identifier. These are used:

S—Special Forces
P—Parachutist
H—Instructor
A—Technical intelligence personnel
R—Research and Development
D—Dog handler
L—Linquist

Thus, as shown in the illustration, the staff sergeant CH-21 aircraft mechanic is also a qualified instructor: 67S4H.

Under the new system the entire 670, aircraft maintenance, series was changed as follows, comparing the old code with the new:

Old		*New*
670.00	Aircraft Maintenance Crewman (Basic entry)	67A10
671.10	Aircraft Mechanic O-1A and U-6A	67B20
672.10	Aircraft Mechanic U-1A	67C20
672.10	Aircraft Mechanic U-8D	67G20
672.20	Aircraft Mechanic OV-1	67H20
672.30	Aircraft Mechanic CV-2	67J20
675.10	Aircraft Mechanic OH-13 and OH-23	67M20
675.20	Aircraft Mechanic UH-1	67N20
675.30	Aircraft Mechanic UH-19 and CH-34	67P20
676.10	Aircraft Mechanic CH-21	67S20
677.10	Aircraft Mechanic CH-37	67T20
678.10	Aircraft Mechanic CH-47	67U20

Capt Lethcoe is section leader, CH-21, 47 section, Dept of Maintenance, USAAVNS, Ft Rucker, Ala.

The 679 series will adopt the 67Z designation. A rotary wing technical inspector who carried a 679.50 MOS will be a 67W20. His counterpart, a fixed wing technical inspector, becomes a 67F20. These are the only two not carrying the 67Z combination.

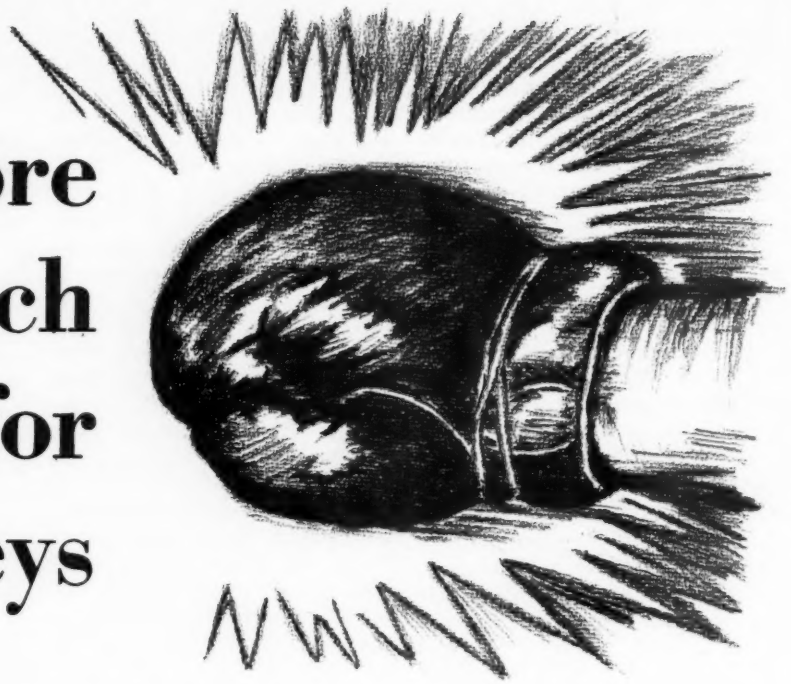
Although the MOS structure changes, the training program remains basically the same. As a new soldier enters the aviation field he attends the 5-week basic entry course to work toward MOS 67A10. Upon successful completion the new mechanic has three assignment choices. He may go to the field, or remain in the flow for additional schooling and enter the intermediate fixed wing course (O-1A and U-6A) or the rotary wing course (OH-23 and OH-13). Upon completion the mechanic may go to the field or to one of the advanced maintenance courses.

Based on current data from the training officer in the Department of Maintenance, USAAVNS, 46 percent of the students finishing the 67A10 course go directly to the 67N20 course. Results have been very satisfactory, with the academic attrition rate no higher than normal. This deviation, bypassing the 67M20 course, has been brought about by the increased emphasis on the UH-1 in Southeast Asia.

The addition of the CH-47 Chinook has brought about an additional program of instruction in the advanced maintenance field.

This new conversion has greatly simplified the MOS designation system. It should aid all personnel in recognizing the right man for the job by his MOS.

More Punch for Hueys



UH-1Bs and Ds will soon receive a "shot in the arm" to boost their performance. The Army has let a contract for an undisclosed number of a new engine developed by the Lycoming Division of AVCO Corporation. Called the T53-L-13 the new engine is exactly the same size and shape and has the same engine mountings as the T53-L-11 now being used but has a standard day rating of 1,400 horsepower instead of 1,100 horsepower.

This increased horsepower should improve engine acceleration time and increase overall performance considerably. At the same time the new engine is expected to reduce fuel consumption while operating at turbine inlet temperatures lower than those of the L-11.

More power is required to drive the compressor, so the new L-13 has two compressor driving turbines (N_1) instead of one as in the L-11 engine. Since there are two instead of one, their stages are lighter and consume less fuel.

Two stages are also used in the power turbine (N_2). They are fully tip shrouded with the blade shrouds recessed into the nozzle cylinders.

The exhaust defuser has been modified to take care of the two-stage turbine. However, it is still of the same basic mechanical design as in the L-11, with the gas channel correspondingly increased to accommodate the increased weight flow through the engine.

Rotor speeds remain unchanged; only the power is increased. Therefore the main bearings for the gas producer and power turbine system are the same as in the L-11 engine.

The L-13's 1,400 horsepower is a military rating available for 30 minutes. Normal (maximum continuous) rating of the engine is 1,250 horsepower.

When the L-13 is installed in an airframe limited to 1,100 horsepower, the new engine can deliver 1,100 horsepower at sea level even when the temperature is 103° F. On a standard day, the 1,100 horsepower is delivered as high as 10,000 feet. Fuel consumption is reduced approximately 9 percent from that of the L-11 operating under similar conditions.

The L-13 is designed to use a minimum of special tools. All turbine blades and compressor blades can be replaced in the field. The manufacturer says all hot section components should have improved reliability since the turbine temperature is reduced and the turbine blades are more lightly loaded.

Production is expected to start in August 1966 and the first installed L-13 be in the field two or three months later.

Army Flight Instructor

Captain Joel L. Hardy

AS A NEW instructor begins his Method of Instruction training, one of the first and last things he will hear is, "You have a lot to learn and each student is a different problem." This statement, however true, doesn't mean a lot to the student instructor. But after he has finished MOI and taught two or three groups of students, the full impact of the meaning begins to come through to him. Each student *is* a different problem, and the instructor must learn from the student as well as teach him.

When a new instructor begins MOI training he is essentially the same as any other Army Aviator. His flying skill and experience is about the same. He knows how to perform certain basic maneuvers. He can fly the Bird Dog into and out of short tactical fields under maximum performance conditions. For all practical purposes, the student instructor is an average Army Aviator.

This same average Army Aviator further develops his flying skill by learning to fly the O-1 from the rear seat. He finds that he has very limited visibility, especially to the front. There is almost no reference to instruments and an altogether different control feel to the O-1. These handicaps demand that he fly more by feel of the aircraft and by reference points both inside and outside the aircraft.

As the old saying goes, he must learn to "fly by the seat of his pants." He must learn to perform from the rear seat the same basic maneuvers and to operate the aircraft into and out of the same short tactical strips under maximum performance conditions. He must learn to fly from the rear seat with above average effectiveness as compared to a person in the front seat. This in itself is no small accomplishment.

But this is not all that is required to become a good instructor. He needs certain teaching techniques that he must gain through classroom participation, the experience of other instructors, and later through his own experiences.

To be sure an instructor must possess qualities other than a wider range of ability in flying the aircraft and his dependability in unexpected or unusual circumstances. He must possess a sense of responsibility, unending patience and determination, plus a reasonably agreeable disposition. But these are obvious necessities. A person may possess all of these, be a splendid pilot, and still be a comparatively poor instructor. Why? Principally because an instructor is dealing with human beings as well as aircraft. He must know both well.

You can learn how to fly the aircraft with a high degree of skill and know your own capability as well as that of the aircraft. You can know through training and experience how not to exceed either of these capabilities. You may possess the sense of responsibility, unending patience and determination, and an agreeable disposition. But these are items that you as the instructor have control over. These are the dependable. But what about the undependables, the student?

A good instructor, constantly learning from his students, will soon realize that the complexity of human nature has no limit. He should always ask himself, Why do men react in the way they do? What kind of personality is this? What can I do to help him with his problem? How can I win his confidence? Have I failed him in any way? Should I wash him out?

Most students will fall into these categories: dull or alert,

slow or rapid, lazy or diligent, bold or shy, and maybe a few others. But there are always those who can't be classified or pigeonholed so easily. No student is so reliable or his behavior so predictable that at one time or other he won't do something completely unpredictable. This is the thing that keeps you, the instructor, ever alert and keeps instructing from becoming a monotonous routine. These actions should be expected and should not cause alarm or sharp criticism on the part of the instructor.

A good instructor will make sure that he has presented all the facts clearly and that the student has understood all that is expected of him in the maneuver. Then the instructor should try to analyze the student's performance to determine cause of the error.

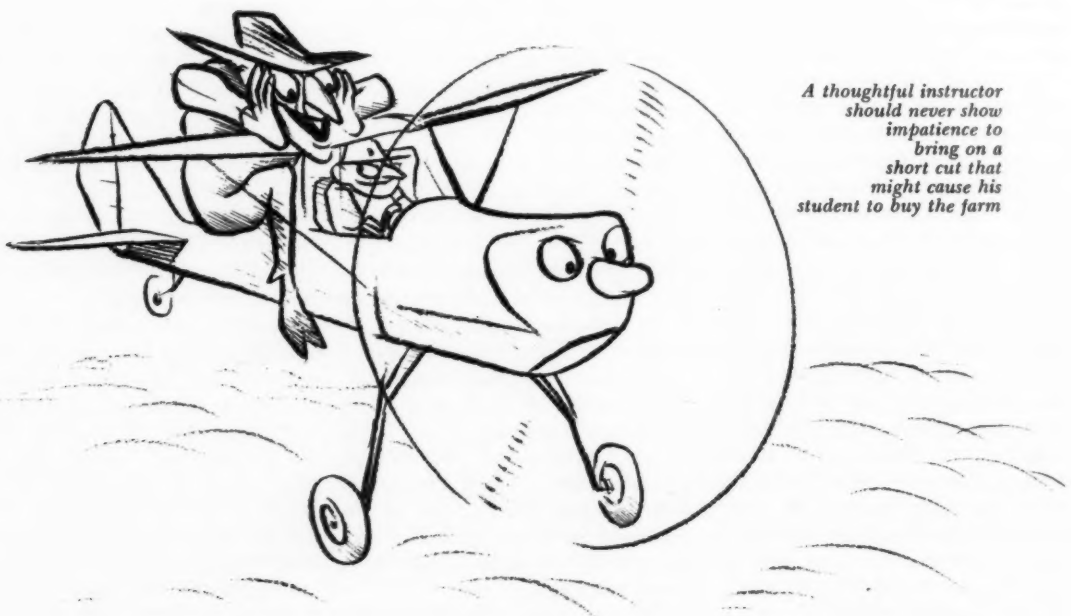
Could it be that the student has learned all but one of several parts of a maneuver and is concentrating on that one part and letting the rest of his performance go to pot? If so, the instructor should try to isolate this one factor and concentrate his instruction on that one phase.

Or could the instructor have placed too much emphasis on one part of the student's performance and neglected his overall performance? Could the student be physically ill? Is he taking any medication which may be detrimental to the learning process or make him unfit for flying? Also the excessive use of alcohol influences learning, even though the user may be sober at the time.

Is he fatigued, either physically or mentally? When a student is tired his performance will become erratic. He will find it difficult to divide his attention and to concentrate on details. Some of the most common items which cause fatigue are prolonged flights, tension, rough air, discomfort, excessive heat or cold, and aircraft noise and vibrations. In considering fatigue, the instructor should also consider his own condition. Instructors who are tired will unconsciously accept progressively lower standards of performance. Although this is not immediately apparent, it should be guarded against by all flight instructors.

Although this article centers on the fixed wing instructor, most of the comments also apply to teaching rotary wing flight

Emotional stress definitely affects a student's ability to absorb and retain instruction. This emotional stress could be the result of fear, personality clashes between instructor and student, poor progress, or personal problems not related to flying.



A thoughtful instructor should never show impatience to bring on a short cut that might cause his student to buy the farm

Unfortunately, personal problems not associated with flying are those which the instructor can do least about. He can only try to effectively interest the student enough that he will forget the outside problem during the flight period, and hope that the student can overcome his personal problem. It must be remembered that as much depends on the student as upon the instructor.

A personality conflict can cause emotional stress between the student and instructor. The instructor should be the first to recognize that such a conflict exists. When a student is not making satisfactory progress in spite of the best efforts of the instructor, then the instructor should initiate an instructor change in the best interest of the student. This does not and should not reflect upon the ability of the instructor under whom the student has failed to show satisfactory progress. Again it must be remembered that as much depends upon the student as upon the instructor. A change of instructor will often cause an improvement in the student's progress.

The responsibilities of a flight instructor are much greater than is often realized. Only by a keen analysis of his students and a deep interest in them can he live up to his responsibilities. No two students are alike, and obviously the same method of instruction will not be equally effective for all students. This is where the instructor must become flexible. He must be able to effectively adjust his teaching technique to fit each student.

A new instructor's experiences are limited. Therefore, in the beginning he will naturally remember his own performances and reactions as a student. Up to a certain point this is good. This memory provides him with sympathy and understanding. But beyond this point, it may become useless or even a definite handicap. For example, a competent instructor soon realizes that some of his students are completely frustrated by problems that never even occurred to him. He will find that methods of instruction that worked best on him may have absolutely no effect, or maybe even a negative effect, on his student. He will find through trial and error that there is no one set of rules or best method to follow in bringing out the best effort in his students.

The instructor is failing in his responsibility if he does not recognize the difference in personalities. He must realize that he can't always insist on perfection from a student who is below average; nor can he insist on anything less than perfection from the student who has a tendency towards laziness and carelessness. He can't be harsh all the time with his shy student; nor can he be easy going all the time on a student who is bold or careless.

Some instructors, unfortunately, see nothing more than how the student performs a maneuver. They can tell him what is wrong with the maneuver and what he did to cause it. In most cases the instructor can even tell him what to do physically to correct the error. In most cases, thankfully, that is enough. But sometimes there are important reasons why a student does things, reasons that go deep into a student's character. These reasons require more than mere knowledge of flying to understand.

A good instructor soon learns that the complexity of human nature has no limit

I am not saying that each flight instructor should be a psychoanalyst, or that he should be able to analyze each student's behavior to the point that everybody falls into one classification or another. I do say, however, that it might not be a bad idea to include a course of elementary psychology* in our current MOI curriculum. Such a course would help the instructor understand some of the more apparent problems, or at least to be able to realize that each student is an individual with his own special problems. And be they big or small no two of them are just alike; nor can we treat them just alike.

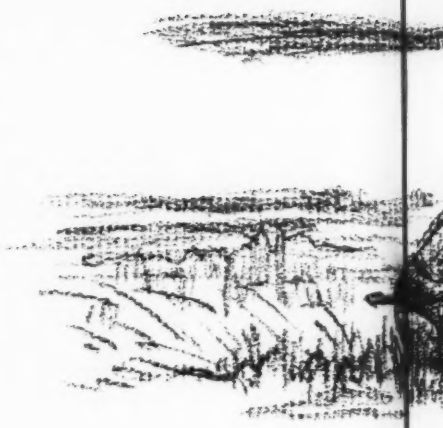
Sometimes, regardless of how conscientious an instructor may be toward his student, he will fail to effectively stimulate him. Flight instructors are not magicians. He can't wave a magic wand and make all the student's problems disappear. He can however make the most of our opportunity and develop our understanding of human behavior by observing our students while they are learning to fly.

*Mohawk, Caribou and Huey IPs attend a 15-hour instructors course in which basic psychology is covered.—Ed

"Professional" Army and Air Force en route air controllers in Vietnam join forces to save lives and aircraft. Combining facilities has benefited both services.

Togetherness

Major Russ Lewis, USAF, Lieutenant George Coutoumanos, U. S. Army



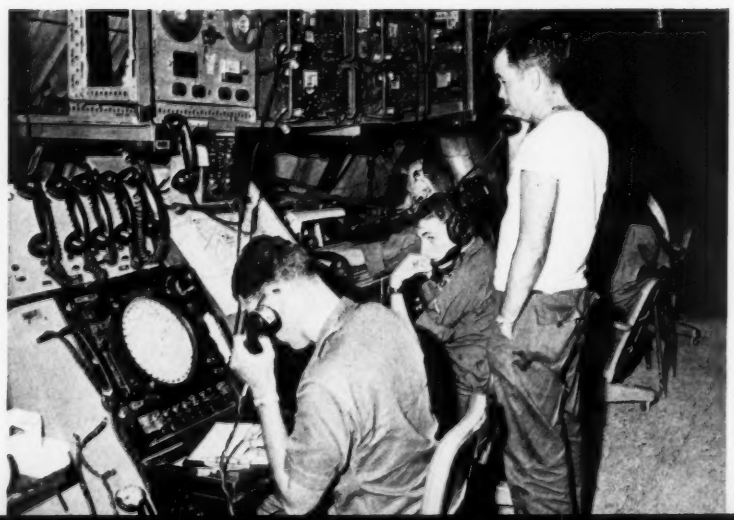
"I HAVE an O-1F on Fox Mike declaring an emergency," said the U.S. Army specialist speaking to the U.S. Air Force radar operator beside him. "He's about on five northeast of Soc Trang, en route from Saigon. Do you have him on radar?"

"Roger, he's on the 090 radial from Can Tho at three-three miles," said the Air Force sergeant behind the scope. "I have another aircraft in the vicinity. I'll divert him to intercept and escort the O-1F into Soc Trang."

Seconds later the O-1F crash-landed in a rice paddy still 10 miles short of Soc Trang. But because of the professionalism and cooperation of Air Force and Army en route controllers he was promptly located by the intercept aircraft and the pilot was evacuated by a UH-1B helicopter to the U. S. Army Hospital at Soc Trang.

After notification that the pick-up had been successful the Army specialist and Air Force sergeant quickly forgot the incident in the hectic routine of everyday duties.

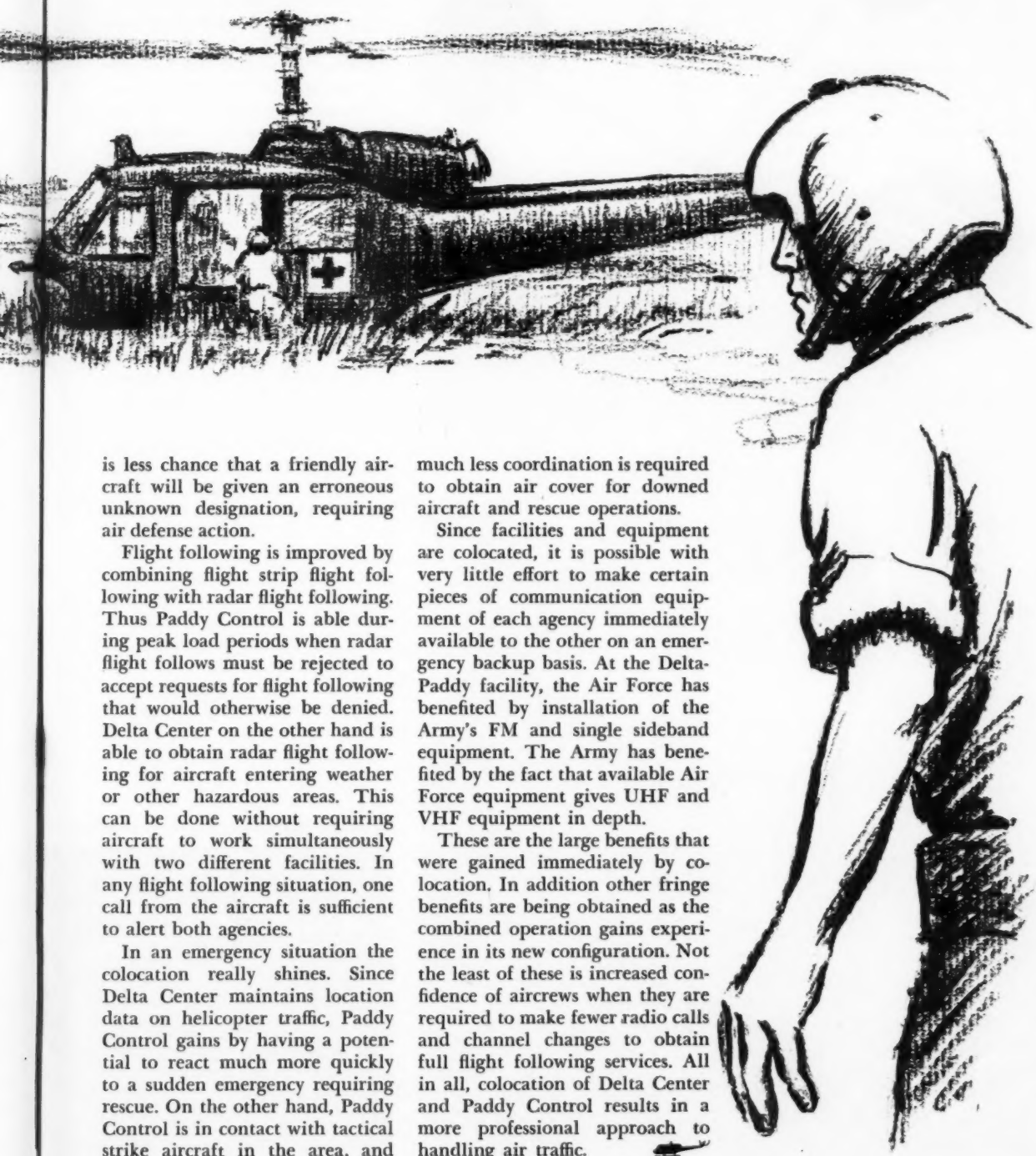
The pilot of the downed aircraft will not easily forget the fear of being down in hostile insurgent territory with only a sidearm, or the relief of seeing that Huey moving in for the pickup. He is only one of a growing list of aviators becoming increasingly aware of the positive control afforded aviators in the IV Corps area of the Republic of Vietnam.



As early as 1963 it was noted that a more complete flight following service would be needed in IV Corps, particularly in the event of a United States buildup to counter the increased insurgency. When the buildup did occur it was decided to combine the facilities of Delta Center, 4th Platoon, 125th Aviation Traffic Company, U. S. Army, and Paddy Control, Detachment 3, 619 Tactical Control Squadron, U. S. Air Force.

During July 1965, Delta Center colocated with Paddy Control. Experience with this joint facility shows that colocation brings significant advantages to both tactical air control and flight following units. These gains can be grouped into three areas: air defense and flight following, emergencies, and equipment.

In the air defense and flight following category, identification is of most importance. With the Army flight following facility (Delta Center) colocated with the combat reporting post (Paddy Control) data is available on virtually all traffic in the area. There



is less chance that a friendly aircraft will be given an erroneous unknown designation, requiring air defense action.

Flight following is improved by combining flight strip flight following with radar flight following. Thus Paddy Control is able during peak load periods when radar flight follows must be rejected to accept requests for flight following that would otherwise be denied. Delta Center on the other hand is able to obtain radar flight following for aircraft entering weather or other hazardous areas. This can be done without requiring aircraft to work simultaneously with two different facilities. In any flight following situation, one call from the aircraft is sufficient to alert both agencies.

In an emergency situation the colocation really shines. Since Delta Center maintains location data on helicopter traffic, Paddy Control gains by having a potential to react much more quickly to a sudden emergency requiring rescue. On the other hand, Paddy Control is in contact with tactical strike aircraft in the area, and much less coordination is required to obtain air cover for downed aircraft and rescue operations.

Since facilities and equipment are colocated, it is possible with very little effort to make certain pieces of communication equipment of each agency immediately available to the other on an emergency backup basis. At the Delta-Paddy facility, the Air Force has benefited by installation of the Army's FM and single sideband equipment. The Army has benefited by the fact that available Air Force equipment gives UHF and VHF equipment in depth.

These are the large benefits that were gained immediately by colocation. In addition other fringe benefits are being obtained as the combined operation gains experience in its new configuration. Not the least of these is increased confidence of aircrews when they are required to make fewer radio calls and channel changes to obtain full flight following services. All in all, colocation of Delta Center and Paddy Control results in a more professional approach to handling air traffic.

accidents on the LOOSE

Captain Pierre V. Brunelle
Department of Rotary Wing Training
Fort Rucker, Ala.

ONE MORNING in the daily flight briefing the instructor pilots were asked for ideas regarding flight safety. The purpose was to stimulate thought and encourage conferences among the IPs on accident prevention.

Our safety discussion seemed to fall into the standard topics of maintenance and aircraft limitations, not to say that these areas have been overexplored. I then remembered when CWO Smith checked me out in the UH-1, how he stressed the point of having the main rotor blade tiedown secured in a safe manner.

At that point I asked CWO Smith to comment on securing loose items in aircraft. This seemed to be a discussion topic in which everyone desired to participate. Imagine a discussion when everyone is at the edge of his seat wanting to tell his story!

CWO Smith gave his dissertation on how a M/R blade tiedown block hit a crewchief on the chin and then struck the pilot on his neck. This all happened during a hard landing caused by a flameout; fortunately no one was seriously injured. Everyone at the briefing now wanted to give his story on how loose equipment almost caused or did cause a personal injury or an aircraft accident.

An instructor who was a crewchief in a CH-21 six years ago told of actions in the cargo compartment when the aircraft encountered turbulent weather on an approach to a 4,000 foot pinnacle. His toolbox hit the compartment wall and then landed on a passenger, causing a leg wound. The toolbox had been positioned under the aircraft seat but not secured.

Another example involved an O-1E where a pair of mechanic's dikes became wedged against the aileron control and caused loss of aircraft control and death of the pilot.

This topic of loose objects in and around aircraft aroused my interest, and I then ventured over to the USABAAR accident prevention section for some additional information. Their data showed that since 1961 injuries caused by loose equipment totaled 24 in rotary wing and 8 in fixed wing. A study of injury causation in 1,214 survivable accidents in Army aircraft from July 1957 to December 1960 revealed 16 fixed wing and 32 rotary wing accidents were caused by cargo compartment agents.

Illustrated are two examples of loose item hazards. The first example shows a clipboard wedged against the cyclic and relief tube

Forced landing in Huey caused by loose block of wood

bracket in a CH-21. The pilot was making an approach to the field and noticed that aft cyclic pull was difficult. He made a running landing with no injuries. A writeup of cyclic control binding was made, and maintenance investigation produced the clipboard as the cause. Quite embarrassing to say the least, you might say. Loose objects have no place in aircraft.

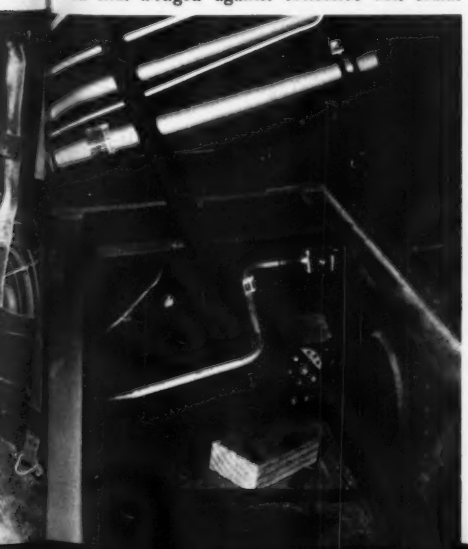
The second example is illustrated by two pictures. The first picture shows a 2" x 4" x 3½" block of wood in the UH-1 baggage compartment. The second picture shows the wood block wedged against the collective pitch bell crank. While on a dual training flight a simulated forced landing was initiated. On power recovery the pilot noticed that proper rotor rpm could not be maintained, so an actual forced landing was made without damage to the aircraft. All this was due to a haphazardly placed block of wood.

The misplacement of tools is one outstanding hazard. At one major installation a static display of loose hardware and tools found in aircraft is maintained. The display included such items as a plastic mallet which struck the pilot on the head during aerobatics and a small boxend wrench which had jammed the aileron controls. Needless to say the owners never claimed their tools.

The teaching point here is not to expound on carelessness but to act as a safety reminder. Safety precautions should be continuously observed, beginning with a thorough preflight and stressing constant housekeeping measures while inflight. Even a small item such as a cigarette lighter improperly secured can cause a needless injury or accident. This may seem rather extreme, but it is food for thought. A loose object in the aircraft might be your downfall, too.

Loose clipboard wedged between cyclic and relief tube bracket created hazard

ock of wood that wedged against collective bell crank



• *from the flight surgeon*

Basic Personal Survival Kit

Captain Kenneth L. Mattox, MC, AMO

SURE, I KNOW there are approved survival kits, but have you ever tried to get one?"

"Unless you are in Vietnam, it's next to impossible to obtain a survival knife and personal survival kit."

"Yes, I picked up a large survival kit and my aircraft had a first aid kit in it, but when the engine 'konked out' and I got my foot burned, I found nothing to treat the burn. Most of the contents had been removed."

"Have you ever flown from Fort Rucker to the Georgia coast, or to New Orleans? Have you flown

from El Paso to the West Coast? Where could you find a worse survival environment?"

These comments are representative of quotes from aviators during their hours of leisure and "expressive psychotherapy" with their friendly flight surgeon.

Survival equipment is a frequent subject for articles in this and other journals. Many hours have been spent around the conference tables developing, analyzing and reanalyzing various merits of this or that survival kit. These facts have emerged:

• Due to the present military buildup, personal survival kits are in short supply except in RVN.

• Individuals disagree as to the specific components desired for a given survival situation.

• No general personal survival kit exists which would contain objects of use in every conceivable survival situation. Cost, space, and weight prohibit such an all inclusive pack.

• Many aviators devise their own personal survival kit to include items of projected usefulness.

The components of the self-made survival kits (as well as those commercially prepared) are tailored to fit specific projected needs. Generally, the components can be grouped into the following categories:

Medicine and dressings—Usually more is included than is needed (an undershirt can serve as a tourniquet, dressing, etc.).

Tools and equipment—It is impossible to include articles for every need. Include only those items which are necessary to allow you to live off the land.

Food—Bouillon cubes contain trace minerals and less than 10 calories. In about any area food is obtainable! Furthermore, with water, you can go two weeks or more without food. Sugar, candy, coffee, and dehydrated soups add a factor of increasing morale but must be considered luxury items.

Luxury items—These make the survival situation more livable but are not actually necessary.

As the individual who is attempting to return to civilization must carry the weight of his clothing, boots, weapon, ammunition, maybe a radio, perhaps material salvaged from aircraft or along the route, it is imperative that necessary equipment and gear be as light as possible. In general, don't "walk out" carrying more than 25 pounds gross weight (this includes boots and clothing).

Although this is not an article outlining survival technique, several points are noteworthy:

• Unless in an unusually hostile territory or in an area where it is impossible to see the wreckage from the air, STAYING WITH THE WRECKAGE WILL USUALLY HASTEN YOUR RESCUE.

• Much survival equipment can be devised from parts of the wreckage and from the land.

• Have a precrash plan in terms of survival. WRITE IT DOWN, and put this plan in your survival kit or flight suit.

• The single most important inclosure in your survival gear is your WILL TO SURVIVE. Keep your spirits up by whatever game you must play. Decide NOW what is the best method for you to maintain enthusiasm—WRITE IT DOWN—PLAN.

The contents of the three available prepared Army personal survival kits are:

(1) PSK-2 (FSN 6545-611-0978)

Adhesive plaster	2
Matches	2 books
Compress, gauze	2
Bouillon cubes	2 pkg
Oxytetracycline tablets	1 vial
Chocolate bar	3
Amphetamine tablets	1 pkg
APC tablets	1 vial
Tetracaine ointment	1 tube
Chloroquine tablets	1 vial
Bandage, absorbent	10
Foil, aluminum	1
Sewing kit	1
Soaped tissues	1 pkg
Water purification tablets	1 bottle
Benzalkonium tincture	1 bottle
Petrolatum	1 tube
Hacksaw blade	1
Razor blade	1
Lipstick, sunburn prev	1

don't walk out with more than 25 pounds gross weight

(2) SEEK-1 (FSN 4240-731-9909)

Aluminum dish	1
Lipstick, antichap and sunburn protective	1
Iodine water purification tablets	50
Bar of soap (3/8 oz)	1
Tincture benzalkonium chloride bottle (2 cc)	1
Illuminating candle	1
Waterproof receptacles (rubber prophylactics)	2
APC tablets	11
Waterproofed matches	6
Single edge razor blade	1
Adhesive plaster	1
Band-Aids	3
Boric acid ointment, tube (1/8 oz)	1
Gauze	1
Salt tablets (sodium chloride)	6
D-methamphetamine hydrochloride tablets	6
Mirror with cord attached	1
Snare wire assembly	1
Pliers	1
Oxytetracycline tablets	16
Wrist compass and strap	1
Fishing kit (plastic container; 2 wet flies with snell, 15 fish hooks, nicket demon plug with double hook and 3 lead strip sinkers)	1
Sewing kit (2 needles and thread)	1
Sparking metal (flint)	1
Fishing line	1
Sun and bug repellent, tube (1 oz)	1
Absorbent cotton (2 grams)	1
Chamois	1
Spare sinkers	2

(3) Special Forces

Firestarter	1
Fishing kit	1
Sewing kit	1
Compass	1
Headnet and mittens	1 set
Salt tablets, 10s	3 strips
Tetracycline hydrochloride tablets, 12s	2 strips
Dextro amphetamine sulfate tablets, 10s	1 strip
Darvon Compound No. 65 capsules, 10s	1 strip
Spensin-ps tablets, 8s	2 strips
Chloroquine and primaquine phosphate tablets, 3s	1 strip
Water purification tablets, 50s	2 bottles
Fungicidal ointment	16
Betadine ointment	6
Insect repellent	2 bottles
Razor knife	1
Gauze, bandage, elastic	2
Adhesive plaster	2
Survival booklet and pencil	1
Signal mirror	1
Flexible saw	1
Flare gun with 2 white flares	1
Bandages, absorbent adhesive	6
Bouillon cubes, 2s	1 pkg
Betadine solution—antiseptic germicide	1 bottle
Eye ointment, 1/8 oz	1 tube

By grouping the above contents into medical

SURVIVAL KIT

items, tools and equipment, and food, a long list is obtained. Derived from this list and from the author's personal preference, the following basic personal survival kit can be put together by anyone until he can obtain one through supply channels. These suggested items do not represent Army policy but merely the personal preference of the author and with full knowledge that each person tailors to his own desires and needs.

MEDICINE: Ritalin (A stimulant—stay awake pill. May use amphetamine.)
- ASA— (may use Darvon) for headache and pain
- Lomotil—for diarrhea; other pills are available for this purpose
- Soap—hygiene and wound cleansing
- Tetracycline eye ointment—may be used on cuts and chapped lips
- Tr benzalkonium—wound disinfectant
- Insect repellent—the VC can smell this up to 1/2 mile
- Water purification tablets—have a shelf life (see water purification tablets below)
- Salt tablets—can grind up and put on food although not as "salty" as common table salt.
- Furacin ointment—for burns and chapped lips

DRESSINGS: Band-Aids, plastic tape, if room, small ace bandage

EQUIPMENT: Matches (waterproof)
- Magnifying glass (can use watch crystal filled with water)
- Mirror
- Knife (2)—razor blades—carry hunting knife with you
- Fishing kit
- Rotenone (fish poison—they float to top of water)
- Aluminum foil—folds flat—many functions
- Two or three birthday candles
- Nylon cord—snare, fishing line, etc.
- Chamois (sponge)—to gather dew and water from other sources
- Plastic sheet, 4′ square for solar still (draw details of snare trigger on plastic)
- [See AVIATION DIGEST, October 1965]
- Pliers (small, multiple utility)
- Condom (2) (water receptacles)
- Compass
- Flints (cigarette lighter type)
- Sewing kits (needle and thread)

MISCELLANEOUS:
- Small toothbrush and toothpaste
- Small pencil
- Toilet paper from C rations

You will need help from your flight surgeon to obtain the drugs. You are cautioned that you should not pilot an aircraft while taking Ritalin or Lomotil.

The personal basic survival kit is just that and its readiness is a direct function of its being kept up to date and in your flight suit. If you have to abandon a burning aircraft you have little time to find and grab stowed gear. The items listed can be carried in a plastic soap dish.

Most downed Army Aviators are rescued in less than an hour, BUT some have had to live off the land for weeks. It is hoped that you will never need the information in this article. But you should remember . . .

—SURVIVAL IS ALWAYS POSSIBLE
—BE PREPARED—PREPLAN
—MAINTAIN YOUR WILL TO SURVIVE

WATER PURIFICATION TABLETS

Widely distributed and used in the Armed Forces is the well known water purification tablet—sometimes referred to as iodine tablets. These tablets are freely distributed to individuals, and are found in individual survival kits, large survival kits and set on the shelves of many dispensaries.

The threat of disease entering the body by way of the mouth is great in areas which have no water

purification program. This is an especially acute problem where "night soil" is used freely in the rice paddies and other agricultural endeavors. Diseases which are a great threat include infectious hepatitis, bacterial enteritis, and amebiasis (causing vomiting and dysentery), various round worms, various tape worms and many others. Aviation personnel are frequently in situations where self-purification of water is necessary.

If one trusts his health to the integrity of the purification tablets, it is important that they serve him faithfully. The manufacturers recommend that one tablet per canteen be used unless the water is especially mirky in which case two tablets per canteen are to be used. After dissolving, a 30-minute wait is recommended before use of the water.

Water purification tablets (SN 6850-250-2620) have a shelf life of 5 years.

In the summer of 1965 the Defense Medical Supply Agency assumed responsibility for storage of water purification tablets. The following information was derived from their studies:

- If the date of pack listed on the bottle is greater than 5 years, discard bottle completely.
- If the date of pack is greater than 2 years, suspicion should be aroused as to full potency.
- Likewise, if the wax seal is broken, the tablets may have lost their potency.
- Do not use if the tablets are:
  Stuck together.
  Broken.
  Pulverized.
  Color is changed appreciably.
- Color change should be interpreted as follows:

When manufactured tablet is steel gray and contains 8 milligrams of titratable iodine.

When beginning to deteriorate, tablets fade toward white and begin to lose titratable iodine.

When tablet is yellowish tan, approximately one-half of useful iodine is gone.

When tablet is brown and "flaky" it is useless.

Final deterioration color is deep iodine brown, and tablet has absolutely no titratable iodine.

- If tablets are needed to purify water and only yellowish tan (one-half strength) and you do not have access to new ones, then it is recommended that you use twice as many as normal.

Check the date of water purification tablets in your possession.

Another individual method of chemically purifying water is through the use of Chlorox or Purex (or other hypochloride solutions). "Straight" Chlorox or Purex may be drunk without significant damage if necessary. Adding Chlorox or Purex to a quantity of water until the smell and taste is quite heavy with the chlorine will render it "safe" if you wait 30 minutes before use. Both the tablets and Chlorox will render water cloudy due to a precipitate. Although looking like lemonade it is still good water.

Occasionally an individual may find himself without any means of chemical purification of water. In such an instance "pure" water should be found or attempts made to purify the water by physical means. Examples and methods include:

- Underground water (not an open well!) if it can be found.
- Fresh seeping ground water—not as good a source as spring water because it can be contaminated with many diseases.
- Water extracted from plants as from certain types of cacti, water which has collected in bamboo stalks, etc. Remember that water from these sources should be clear. If it is milky or mirky do not use it.
- Rain water collected during a shower.
- Dew collected with a sponge or chamois.
- Water derived from a solar still.
- Pass (filter) water through three feet of bamboo that has been filled with sand.
- Pour (filter) water through a cloth that has been filled with sand. (These last two methods will *not* necessarily remove the bacteria causing dysentery and cholera, or virus causing such diseases as hepatitis.)
- Boiling water for 30 minutes will kill most disease producing organisms. Certain toxins, however, are unaffected by heat.

If water purification by a chemical or physical means has an unbearably disagreeable odor, charcoal from coals, ground up into a powder can be added to the water to reduce the odor. Allow water to stand for about 45 minutes before drinking to allow the charcoal to settle. However, you can drink this water immediately as charcoal is harmless and will help in reducing gas in the stomach and intestines.

Not only can disease enter the body by way of the mouth and stomach, but some of them can enter through the skin and especially through cuts and abrasions. Therefore, care should be used when washing and shaving with suspicious water.

Aviators and all Armed Forces personnel are warned that unsafe water may be ever present in a survival situation. Knowledge of water purification principles will aid in continuing good health.

STRAIGHT AND NARROW

Accident number 1. Note left gear buried in soft ground immediately adjacent to runway.

FROM THE 1965 Aircraft Accident Prevention Survey, page 4:

Are the preparation and width of the runway shoulders suitable for aircraft stationed at the field?

Is the condition of runways and shoulders satisfactory?

Do the lengths and widths meet engineer standards for Army airfields?

Accident 1

A JOV-1A approached the airfield—

Pilot: "We entered right traffic for runway 26 and performed the downwind checks, including props to 1600 rpm, gear down and locked, 15° flaps, power steering on, and 120 knots indicated.

"I made my turn to base, dropped 45° flaps, called the tower with gear and pressure, and was cleared to land. The wind was calm.

"Maintaining 100-105 knots on base, I made my turn to final, advanced the props to full rpm, put the speed boards out, rechecked the gear, and lined up with the runway, maintaining 90 knots.

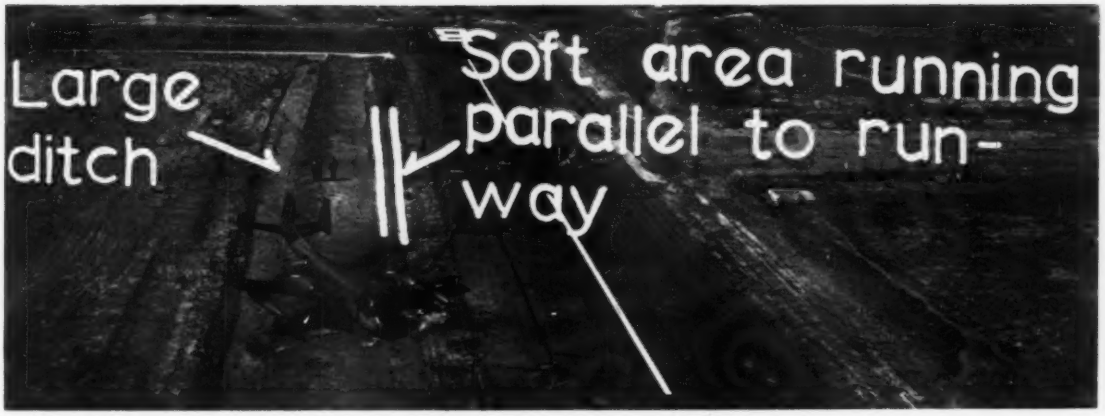
"Roundout was made approximately over the numbers and I reduced power to about 20 pounds. We touched down on the center line in what appeared to be a three-point attitude. I then went into full reverse and didn't notice anything unusual about the reverse engagement. At this point, the aircraft started veering to the right.

"I started feeding in left rudder until it reached the full stop position and it didn't have any effect. I then came in with full left aileron and started reducing power on no. 2 engine, trying to swing the aircraft to the left with differential power. This had no noticeable effect. I then slid my feet up to the brakes and applied pressure on the left brake. Shortly afterwards, the nose gear hit soft dirt and collapsed. After the aircraft came to a stop, I manually feathered both engines. We then disarmed our seats and began turning off switches and pulling circuit breakers. I turned off the battery and engine switches and we both left the aircraft through the side hatches."

Investigation board analysis: ". . . The right main landing gear left the runway first. After the nose wheel left the runway, it struck and broke a runway light. The nose tire was not punctured and continued to roll freely. After the nose wheel ran over the runway light, the right main gear sank into the poorly compacted trench, causing the aircraft to turn abruptly to the right with the resultant force still acting along its original course. The left main

crash sense

PREPARED BY THE U. S. ARMY BOARD FOR AVIATION ACCIDENT RESEARCH



Accident number 2. Nose gear dug into soft ground and collapsed as aircraft left runway. Note large ditch under right wing and ditch and culvert on opposite side of runway.

gear abruptly left the runway and the nose gear sank into the same ditch as the right main gear and sheared. The left main gear sank into the soft ditch and caused the aircraft to turn sharply to the left. . ."

Among the cause factors the board listed for this accident was: "A filled in ditch, which is not adequately compacted, exists on each side of the runway." The board recommended that the unsafe conditions of the runway be repaired.

The reviewing official stated that a work order for widening and improving the runway shoulders had been submitted.

In the forwarding correspondence of this accident report was: ". . . The primary cause of the accident is considered loss of directional control. In reviewing this accident, the width of runway and condition of runway shoulders were considered. The proposed engineer work required to widen the runway and prepare runway shoulders was estimated to cost over $90,000. This proposal will be presented to the Post Planning Board for project submission consideration."

Accident 2

Five days after accident number 1, an OV-1A pilot taxied out for takeoff from the same runway—

Pilot: "The aircraft was written up for a cracked nose wheel shimming damper and a placard was posted on the dash to use the nose wheel steering only on landing.

"I pulled onto the runway behind another aircraft after it had started its takeoff roll. I centered the aircraft on the runway and allowed it to roll forward a few feet to ensure that the nose wheel was straight. The control tower cleared me for takeoff and I advanced the no. 1 power lever forward of the no. 2 slightly to compensate for torque. The no. 2 power was at 20 pounds of torque.

"I released the brakes to start my takeoff roll and the aircraft started to turn slightly to the right. As I slowly started to bring the no. 2 power lever even with the no. 1, the aircraft began to turn a little to the left. I again used differential power by advancing no. 1 power lever forward slightly and the aircraft began to turn to the right. As I again brought the no. 2 up, the aircraft started a gentle turn to the left.

"I then brought the no. 1 lever even with the no. 2 again and experienced a severe swerve to the right. At this point, I put the engines into full reverse in an attempt to stop the aircraft. We left the runway and the nose wheel collapsed. I saw that no. 1 prop was hitting dirt and shut both engines down by pulling the prop levers into the feather position. I shut all switches off and got out of the aircraft. I would estimate that the engines were developing about 40-50 pounds of torque when I put them into reverse.

"I was aware of the crosswind [reported as varying from 340° to 10° at 11 knots; takeoff was made on runway 08] before I took the active. I did not apply as much differential power prior to starting my takeoff roll as I would normally because of the crosswind. I estimate that I had a differential power of approximately five pounds torque."

Investigation board analysis: "The board felt that the accident would have been prevented if the power steering had been in operation. However, the pilot was aware of the placard in the aircraft and

. . . all three could have been prevented through an aircraft accident prevention survey and effective corrective action

had left the steering turned off. A good no-steering takeoff technique would have prevented the accident. . .

"The 50 foot runway leaves little room for error on takeoffs and landings. With a runway width of 100 or 150 feet, the aircraft could have stopped prior to leaving it. The shoulders were tested and a 2 foot wide strip running parallel to the runway was found to be too soft to support an OV-1. With 25-50 feet of firm shoulders for the narrow runway, accidents of this kind could be prevented. . ."

In the corrective action taken listed by the accident report was: "A work order for widening and improving the shoulders at the airfield has been submitted. Both of these actions will be followed up."

Accident 3

Two and one-half months after accident number 2, a JOV-1C was on a short field approach to the same runway—

Pilot: "The approach was satisfactory, with 85-90 knots carried on final, and 20-22 pounds of torque. At touchdown, I applied full reverse and the aircraft swerved severely to the left. I applied right brake and rudder to correct the swerve, but it had little or no effect.

"By this time, the aircraft was off the runway. It seemed to go into a depression in the ground and the right wing or propeller dug into the ground. We continued forward for a short distance and came to a halt in a tail low attitude. I shut off both engine master switches and got out."

Investigation board analysis: ". . . The aircraft proceeded off the left side of the runway diagonally down a slight grade which made corrective action back to the right even more difficult. . ."

Among the cause factors listed by the board was: "Inadequate airfield facilities for continuous OV-1 operations." The board recommended that adequate facilities be provided at the airfield.

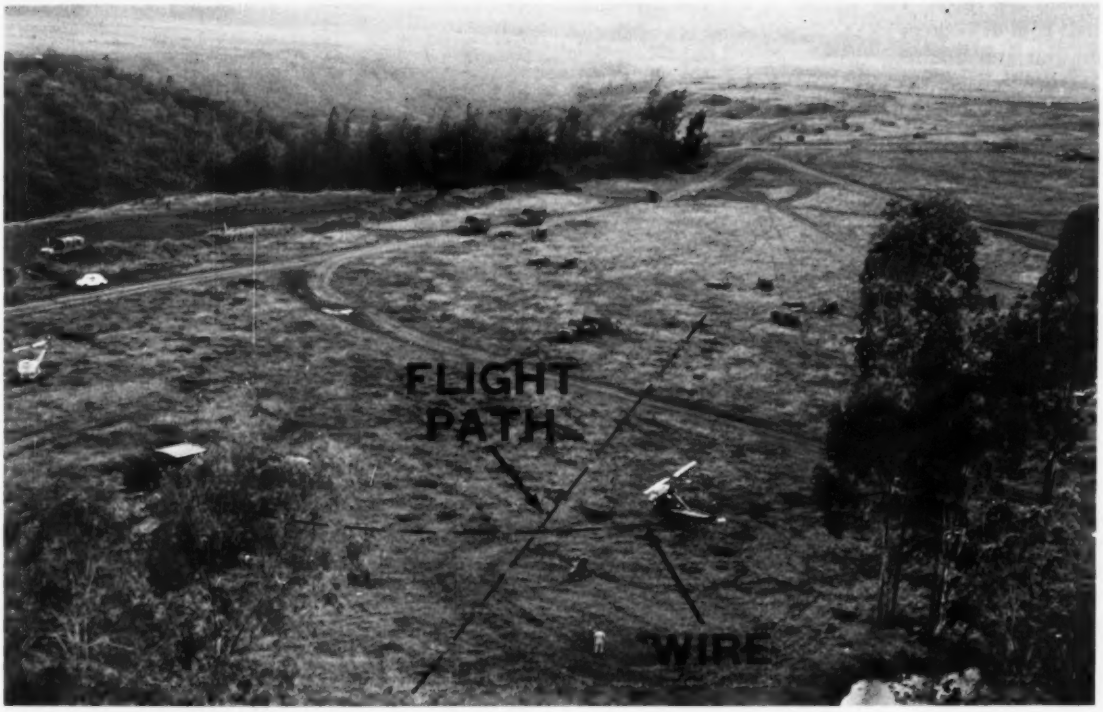
This statement was in the report: "The work order requesting improvement of facilities at the airfield is now at the Post Planning Board for study. Additionally, the engineer battalion has started construction to improve and lengthen the runway *overruns.*"

The reviewing official stated: ". . . Even though the pilot used improper techniques to regain directional control after an apparent defective reversal, it is felt there would have been little or no damage to the aircraft had the incident occurred at an adequate airfield."

Prevention

Regardless of the pilot, maintenance, and materiel cause factors involved in these accidents, all three could have been prevented through an aircraft accident prevention survey and effective follow-up corrective action. The estimated cost of $90,000 to widen the runway and prepare runway shoulders could have been more than offset by the dollar loss of $127,922 from these three accidents. It must be considered false economy to delay preventive action of this type when operating aircraft that cost more than $1,000,000 each.

Accident number 3. Soft ground beside runway trapped third victim.



Pilot made approach into tree line . . .

. . . struck four strands of wire with main rotor.

WIRE STRIKES

OH-23G pilot: "I was completing an assigned flight in support of an artillery battalion and was on my way to report to the battalion commander. I made a low reconnaissance of the proposed landing site and saw no obstructions as I was approaching. I was aware of artillery position stakes in the immediate area and extended my flight path to land well behind the stakes.

"At about 10-15 feet, with an airspeed of 15-20 knots, I saw two field wire lines immediately in my flight path. This was the first time I saw the wires. The main rotor struck and severed the wires and there was a very slight jerk in the cyclic.

"I stopped all forward movement of the aircraft and began to back out of the area and away from the wires. Almost at the same time, there was a sudden jerk on the aft section of the aircraft, pulling the tail boom down. Then the tail rotor struck the ground, directional control was lost, and the aircraft began making 360° turns to the right. In an effort to stop the turning, I cut the power and bot-

tomed the pitch. The aircraft made two and one-half complete turns to the right before it struck the ground and bounced twice."

Question: "What was your mission?"

Answer: "I was instructed to land at the field and report to the battalion S-3. I was used in convoy surveillance during the morning and flew an aerial adjustment flight after lunch. I dropped the observers at the old battalion command post and proceeded to the new command post to see if my services would be required again."

Question: "Did you make a low reconnaissance?"

Answer: "Yes, from the southeast to the northwest over the trees."

Question: "What were you looking for?"

Answer: "I was looking generally for the battalion command post location and an area which would not interfere with the batteries' positions."

Question: "Were you looking for obstructions such as wires during your low reconnaissance?"

Answer: "I always look for obstructions. I was not looking for wires specifically, except on final."

Question: "When did you determine this was a safe landing area?"

Answer: "I would say after I completed my low pass and located the unit I wanted to contact."

Question: "Why did you pick that particular landing site?"

Answer: "I wanted to land in an area close enough to the command post to get my information without hampering their operations."

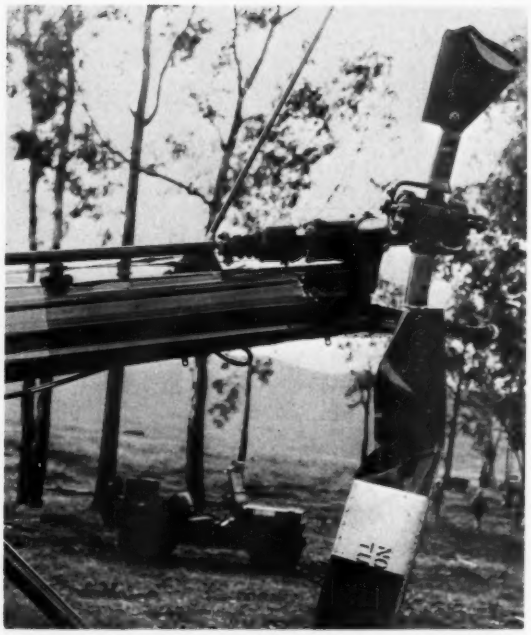
Investigation board analysis: "It was determined that the helicopter struck four strands of WD 1/TT communication wire while in a slightly nose high attitude with no appreciable damage to the aircraft. In his attempt to move the Raven to the rear by applying more aft cyclic, the pilot assumed a nose high attitude and the tail rotor struck the ground, shearing one blade and destroying the other. The impact of the tail rotor striking the ground caused the one inch drive shaft to shear and caused compression damage to the tail boom and drive train. The engine and main rotor oversped and burned out the mercury clutch. Final touchdown was accomplished while the helicopter was in a flat turn to the right. It touched down hard and bounced twice, resulting in major damage to the landing gear skid assembly and to the basic body. Damage to the aircraft was estimated at $26,870."

The board recommended:

1. That a continuous program be implemented to impress aviators with the need to suspect and assume that wires are located in and around command post areas, and to never select a landing site within a tree line when an open area is available.

2. That all ground units of battalion size or larger be required to establish marked helipads during field training.

3. That necessary training be provided ground commanders by organic aviation personnel to include selection and marking of helipads, stressing that all elevated wires in the vicinity of helipads be marked.

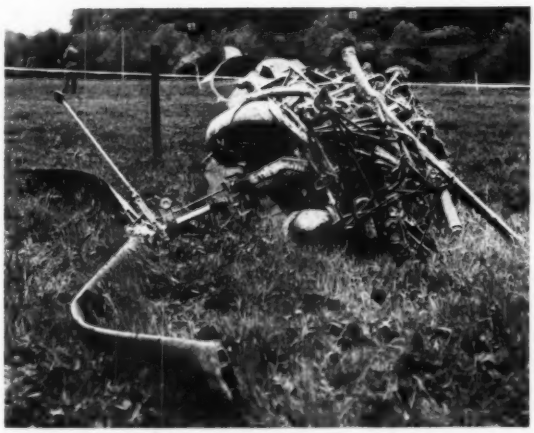


Tail rotor dug into ground trying to back away from wires

OH-13H pilot: "The operations officer informed me that I had a mission to fly an observer along the river and back. We took off at 1430 and flew south along the river and back at 500 feet. As we reached the north limit of our reconnaissance, the observer asked me if I could fly low level so he could look at the slope of the river bank to see if it would be an obstacle to heavy track traffic.

"I made a 180° turn and started south up the river, approximately 6 feet off the water. I had been flying at this altitude about five minutes when I saw a high tension wire about 300 meters in front of me. I started slowing down and at that point I saw three strands of wire about 6 feet off the water. I pulled in power and tried to cyclic climb over the wire. The tail rotor guard struck the wire and the aircraft started to spin to the left. We made a full turn to the left before I could cut the throttle.

Broken wires and background of trees as seen along flight path . . .



. . . tell story of destroyed OH-13H

"When I cut the throttle, the aircraft stopped spinning, but it was traveling backwards to the line of flight. I tried to stop the backward flight and make the river bank. At about 3 feet, I pulled all of the collective pitch that was left and the aircraft struck the right bank of the river on an approximate heading of north.

"I asked the observer if he was hurt and he replied no. I then told him to get out of the aircraft because I thought it was going to tip back into the river."

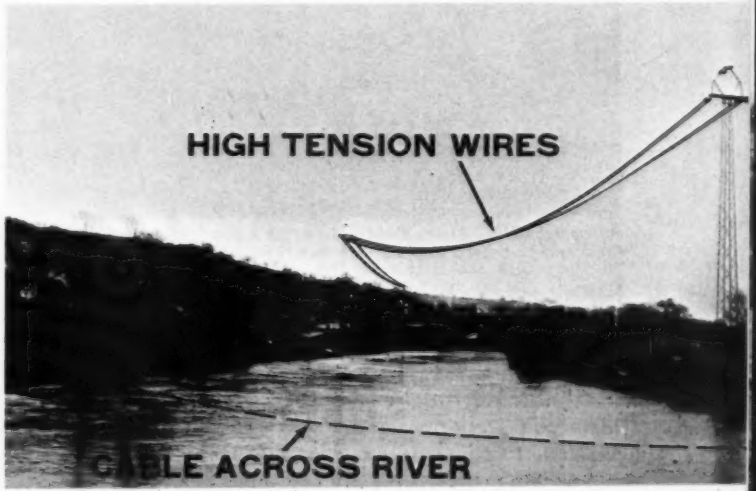
Investigation board conclusion: "The pilot's attention was channeled on the powerlines in the distance and he failed to notice the lower wires until it was too late to avoid them."

PRIMARY CAUSE—*WIRE STRIKE?*

Pilot: "I was on a contour approach to the airfield and lifted up to fly over a town, then dropped back down and continued contour flying. There were powerlines on my right and I kept a close watch on them as I felt they would eventually cross the valley I was flying in. I recall pulling back on the cyclic, but I do not recall the reason I wanted to climb unless it was because of the trees in front of me. At no time did I see wires in front of me. After starting the climb, I began to tumble and the thought flashed through my mind that I had struck wires."

Investigation narrative: ". . . The pilot did not remember seeing the wires, but remembered put-

OH-13 came to rest in water at edge of river



Pilot was concentrating on high tension wires ahead and did not see cables

ting the aircraft into a climb either to go over the trees or to gain altitude for his approach. A climb attitude was confirmed by the board which determined through examining the wreckage that the wires were struck with the tail section in front of the tail rotor guard.

"The pilot next remembered an extreme vibration in the tail section, the bubble breaking, and seeing the ground come up. His next recollection was talking to the provost marshal before he was evacuated for medical aid. . ."

After striking the wire, the Sioux pitched down and the main rotor blades cut the tail section off in five places. The OH-13 struck the ground first on its right skid and came to rest inverted. A fire started and the pilot was rescued by a passing truck driver. Although dazed by the accident, the pilot escaped with minor injuries. The helicopter was destroyed.

The investigation board listed the primary cause of this accident as "wire strike." It listed contributing causes as "inadequate reconnaissance" and "flying too low."

"Wire strike" is an accurate description for this type of accident, but it can hardly be considered a primary cause. The cause in this case is to be found in the contributing factors listed by the board—flying too low without an adequate reconnaissance to locate hidden obstacles.

Overweight UH-1B was destroyed during attempted takeoff at density altitude of 5,010 feet. Crew and passengers escaped with minor injuries.

OVERWEIGHT UH-1B

With a pilot, copilot, crewchief, gunner, and two passengers aboard, the UH-1B was scheduled for a flight to visit a project at another base.

Pilot: "After completing the communications check, the copilot stated that he had completed a runup procedure. I watched the check and verified that it was complete.

"Prior to running up to 6600 rpm, I checked with the copilot to verify that he checked the fuel boost

circuit breakers. He stated that he had checked both. I then increased the rpm to 6600 and the copilot called the tower for takeoff instructions. The tower, as I recall, gave the wind as 260° at 4 knots, density altitude 5,000 feet, and altimeter 29.93.

"I then told the copilot I would check the power to hover. I picked up and the rpm held at 6600. As I hovered out to the runway, the rpm dropped to just under 6500. Still hovering, I beeped it up to max or just under 6600, and the gas producer was not quite 95 percent. The aircraft developed 98 percent plus, so I felt I could make a normal takeoff with no problem.

"I tilted the nose forward and started to move off the ground cushion. As I moved off the cushion, the rpm began to drop. I held the collective and tried to pick up airspeed. At this time, I was approximately 20 feet off the ground and I turned 30° or so to the right of the runway to head into the wind. I cleared the perimeter light pole by about 10 feet and kept the collective constant, trying to build rpm. At that time, the rpm started a steady decrease. It dropped down to 6100 and the copilot came on intercom and said to push the nose forward and pick up translational lift. Almost at that instant, he pushed the cyclic forward and the bottom fell out with a very high rate of sink.

"I concentrated on keeping the aircraft straight, but at touchdown the controls were almost ineffective. We touched down at approximately 25 knots airspeed and 5900 rpm. We landed hard and I was thrown forward. My harness was locked and my helmet was on tight. Seconds later, one of the passengers was pulling on me to get me out. I unfastened my seat belt and climbed out. The copilot had turned off all the switches and the fuel and made a front exit. I walked around the front of the aircraft and saw that all personnel were clear."

Question: "Were you aware of the total aircraft weight?"

Answer: "I estimated the total weight at about 8,300 pounds. I was very conscious of the weight."

Question: "Had you done any flying with passengers and with the command console in this aircraft?"

Answer: "No."

Question: "Was the copilot on the controls at any time during the flight?"

Answer: "At the time he said to lower the nose, the cyclic moved forward about 3 inches very abruptly. When it went forward, the controls seemed to lose their effectiveness and I decided to attempt to keep the aircraft straight and level."

Question: "Did you consider putting the aircraft down between the perimeter fence and the powerline?"

Answer: "No."

Findings of the accident investigation board were:

Primary – Failure to abort takeoff prior to reaching a critical low point in rotor rpm.

Contributing – High density altitude–5,010 feet, and aircraft overweight (8,197 pounds) for density altitude.

The board recommended:

1. That aviator UH-1 standardization training stress that aviators abort takeoffs when engine rpm falls below 6400 rpm and rotor rpm falls below 314.

2. That each aircraft be placarded, or an entry made on the DA Form 2408-13, with the total aircraft weight to include all installed and loose equipment normally carried.

3. That for each 500 foot increase in density altitude above standard conditions, the allowable gross weight of the aircraft be decreased by 100 pounds.

4. That each airmobile company conduct immediate training in the use of the takeoff gross weight limitation chart in fig. 2-7, section II, chapter 14, TM 55-1520-211-10.

5. That a large scale reproduction of the chart from the -10 listed in recommendation 4 be posted in unit operations offices where flight plans are filed.

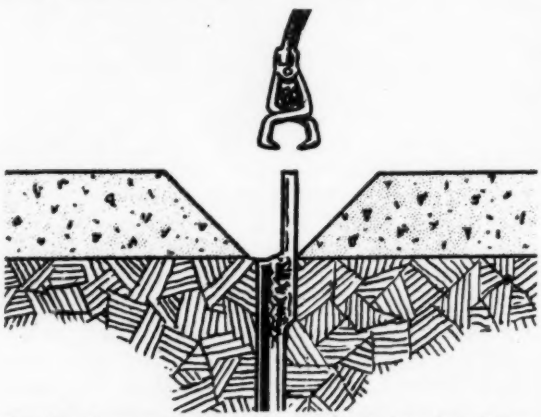
6. That the total aircraft weight of each aircraft in the unit be posted in the operations office.

UH-1D STAKEOUT

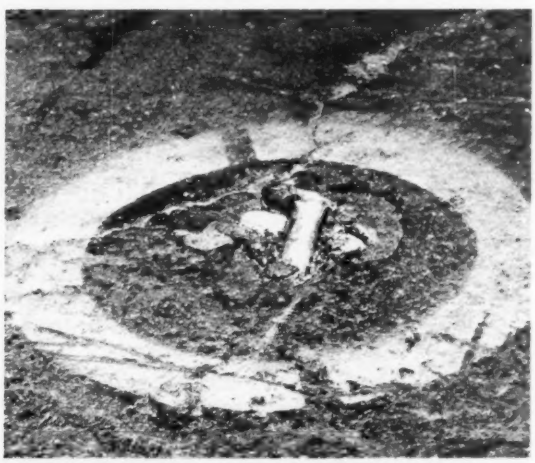
IP: "The pilot and I had just filed a flight plan and contacted RAPCON for permission to move from our location to a training area, a distance of approximately one-quarter mile. After preflight, the pilot occupied the right seat and I took the left seat. The pilot made a normal start and went through his runup. As he stabilized the rpm at 6600, I told him I'd catch the anticollision light if he was ready to go. I looked at his hand on the collective pitch and saw he was getting ready to pick the aircraft up. The aircraft began to move to the right and appeared to roll toward the right, then began to spin around on the ground. The main rotor blades contacted both the aircraft and the ground. We seemed to make a couple of 360° turns in the same place, coming to rest in about the position from which we started. The entire accident

UH-1D slid down cross tubes and came to rest on right lower side. Main rotor lies across tail rotor.

Skid shows dent made by contact with stake



Drawing shows example of correct ground stake installation. Top of stake is flush with surface and a small area adjacent to the stake is dished out to permit attaching ground wire.



Grounding stake extended 1½" above surface

seemed to last approximately 10-15 seconds."

Pilot: "I beeped the rpm to full and back to 6600. When everything was stabilized, I applied enough collective to get the aircraft light on its skids. We started to skid in a right direction that cyclic wasn't stopping. I bottomed collective pitch and a right uncontrollable skidding turn started. I do not know if the ship made one 360° turn or not. I was occupied in keeping the collective bottomed, the cyclic neutral when parts were being chopped off, and rolling the throttle off, while pushing the button with the same hand. The aircraft came to rest off the skids in approximately the same position as it started. I turned the fuel switches off and got out the left front door area to find the engine on fire and the crewchief putting out the fire with the aircraft extinguisher. The fuel cells were ruptured and leaking fuel."

Investigation board narrative: "The aircraft was parked close to a refueling grounding stake. The metal stake was a copper alloy rod approximately ⅝ inch in diameter. It was driven into the ground with about 1½ inches protruding above the asphalt surface. Ground scars at the scene indicated that the helicopter's right skid, before the attempted liftoff, was located approximately 18-24 inches to the left of the stake.

"The pilot, while attempting to lift off, permitted the aircraft to turn and slide to the right. This turn and slide were the result of insufficient antitorque and cyclic control to compensate for normal torque reaction when pitch was applied with a left quartering tail wind. The smooth asphalt surface, which allowed the aircraft to turn and slide easily, made it difficult to determine proper initial control movements until a reaction was noted.

"The right skid came into contact with the stake, causing the aircraft to stop momentarily and then pivot around the stake. The momentary sudden stoppage caused the fuselage to exert a side pressure on the skid bracket centering rivets, imposing a sideward movement stress which the rivets were not designed to withstand. The rivets sheared, allowing the fuselage to be displaced to the right of center of the cross tubes, enough to cause the helicopter to start rolling over on its right side. The fuselage slid down the curved portion of the cross tubes a distance that was beyond the limits of lateral control built into the rotor head. The pilot immediately bottomed pitch when he became aware that the helicopter was rolling to the right, but the displacement of the fuselage allowed the main rotor blades to strike the surface to the right of the aircraft.

"The main rotor blades striking the surface resulted in the aircraft making a 360° turn to the right. During this turn, a portion of the main rotor blades disintegrated. Sudden reduction in rotor speed caused the mast to shear, allowing the engine to overspeed momentarily to a point where N_1 and N_2 turbine blades failed."

DOWNWIND AUTOROTATION

An OH-13H pilot was assigned a service flight to carry an officer from another service to his destination and back to the point of departure. The outbound flight was routine, as was the return flight until the aircraft reached a point 5 miles from the home field where the pilot decided to make a practice power recovery autorotation to a large open field. He started a 270° autorotative turn to the right at approximately 600-700 feet. During the initial portion of the autorotation, the rpm built rapidly and he applied collective to keep it in the normal operating range.

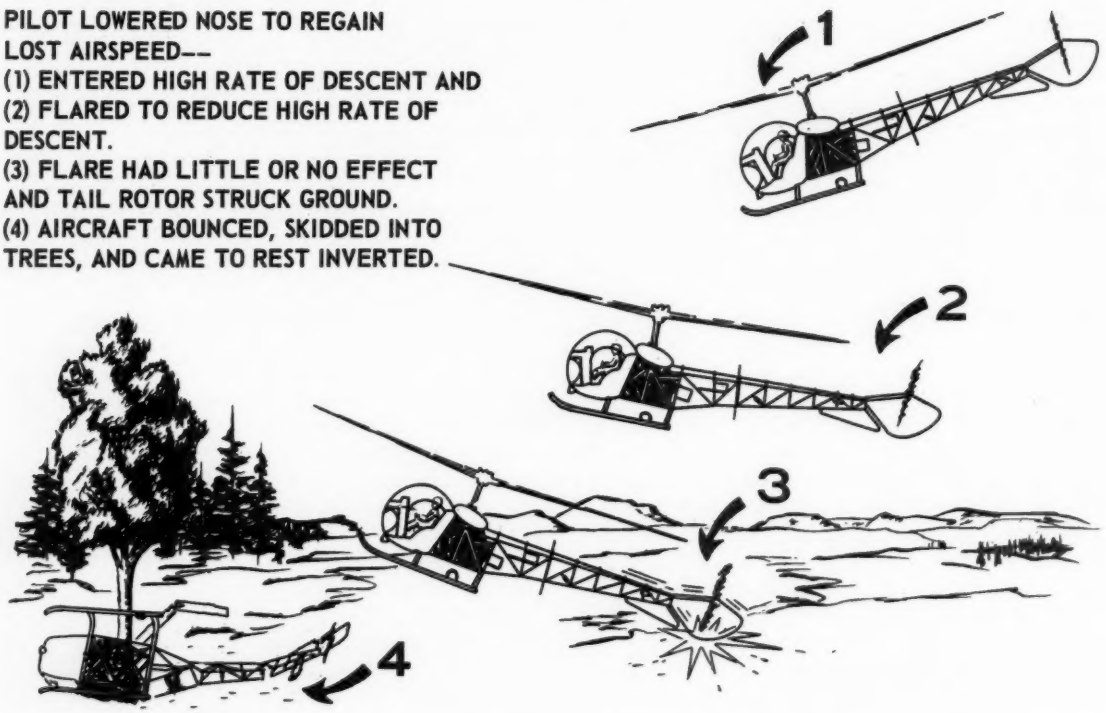
At approximately 180° from his initial heading, the pilot noticed that his airspeed had reduced to about 10 knots. He lowered the nose of the helicopter to regain his lost airspeed and this resulted in a high rate of descent. At approximately 50 feet he started a power recovery. It was too late. The tail rotor guard and tail rotor struck the ground simultaneously, leaving a skid mark 8 feet long and 5 inches deep in the soft and freshly plowed field. The Sioux leveled, slid, and bounced across the field into a grove of hardwood trees. It rolled to the left, slid down a tree, and burst into flames. Pilot and his passenger escaped injury, but the OH-13 was destroyed.

This pilot made his first mistake when he decided to do an autorotation with a passenger aboard, in violation of AR 95-1.

He made his second mistake when he guessed the wind to be from the west. Actually the wind was from the south at 10 knots and on his nose when he started the autorotation. This led him into a downwind autorotation which the aircraft accident investigation board determined to be the primary cause of the accident. The board listed contributing factors as:

crash sense

PILOT LOWERED NOSE TO REGAIN LOST AIRSPEED--
(1) ENTERED HIGH RATE OF DESCENT AND
(2) FLARED TO REDUCE HIGH RATE OF DESCENT.
(3) FLARE HAD LITTLE OR NO EFFECT AND TAIL ROTOR STRUCK GROUND.
(4) AIRCRAFT BOUNCED, SKIDDED INTO TREES, AND CAME TO REST INVERTED.



Low airspeed in the turn caused by a nose high attitude.

Too much attention devoted to high rotor rpm and not enough to airspeed.

Mistaking downwind groundspeed as airspeed, which caused a further delay in recognizing the low airspeed.

NO WARNING

CH-34C IP: "I was assigned a flight to pick up four passengers at another location, drop two of the passengers at a field site, and proceed to another field site. I was flying in the left seat and acting in the capacity of IP. The flight was uneventful as we arrived at the first field site and discharged two passengers.

"We departed this field site by making a modified maximum performance takeoff—power settings 2525 engine rpm and 45" manifold pressure. We made this type takeoff to avoid blowing snow. The pilot was flying the aircraft at this time and as he reduced power and turned on course, all instruments were in the green. At that time, I began to look at my navigation charts and tuned in a radio beacon along our intended flight path. The pilot turned to a heading of 340°.

"I made a check of the instruments and saw that we were using 41" of manifold pressure at 2500 engine rpm to cruise at 85 knots in level flight. This high manifold pressure setting indicated that something was wrong. I immediately checked the carburetor air, the mixture, and the cylinder head temperature. The carburetor air and cylinder head temperatures were normal and the mixture was full rich. These checks took approximately 3-5 seconds.

"The engine began to run rough and made chattering metallic noises. The engine rpm decreased to 2000. I immediately took control and entered auto-

Pilot had no warning of engine failure over heavily wooded and hilly terrain

rotation. I made a 90° turn to the right, heading toward a narrow wooded valley. I noted that the engine was running smoothly at approximately 1200 rpm. I increased throttle until the engine rpm reached 1900 and the engine ran rough again for a few seconds, then failed completely.

"At that point, we were level with the hills in the area and the terrain in front of me presented no forced landing areas. I made a 60° autorotative turn to the left and proceeded toward the bottom of another narrow wooded valley with 6-12 foot fir trees and a dirt road which lay at the base of a steep hill to my left.

"I realized that I could not land on the narrow road as 100-foot pine trees lined the left side of the road. I turned 10° right and planned to touch down on the right side of the road on what appeared to be the right shoulder of the road. The shoulder appeared to be covered with small trees and heavy underbrush. Unfortunately, it turned out to be a ditch.

"The tail wheel touched down with the aircraft in a flare and, as the main gear came down, the left wheel hit the right side of the road and the aircraft pitched forward and to the left. I had full collective applied and aft cyclic. The aircraft came to rest with the left side over the ditch and the right side against the side of the road."

Engine analysis report: "No. 6 cylinder articulating rod failed, causing extensive damage to the skirts, connecting rods, and pistons of cylinders number 4, 5, 6, and 7. Both halves of the crank case were extensively damaged."

Engine oil analysis report: "Sample did not meet specification for viscosity. Test results indicated oil formed sludge while in use, possibly due to dirty engine."

The accident investigation board determined the following facts:

1. Analysis of the engine revealed that the no. 6 cylinder articulating rod failed.
2. There was no pilot or supervisory error.
3. Weather was not a factor.
4. The altitude, averaging 600 feet above the highest terrain, and flight path selected by the pilot afforded as good a selection of forced landing areas as would have any other flight path or altitude.
5. The pilot displayed good judgment and technique, considering the terrain available, in selecting the touchdown area and in executing a forced landing.
6. *The modification work order, MWO 55-1520-202-34/16, to install a chip detector warning light had not been complied with.*

crash sense

OUT OF GAS

An OH-13H pilot reached his destination and landed. He asked for refueling, made several calls to the refueling unit, and waited for 40 minutes.

Pilot: "After 40 minutes, I decided to make the return flight before my clearance terminated. I was concerned that I would not be able to get the weather if I refiled, so I computed the en route time and winds and concluded that I had enough fuel for the return flight.

"I took off approximately five minutes later and flew at an altitude of 1,800-2,000 feet. Approximately 50 minutes later, the engine caught once and stopped. I immediately went into autorotation and made a slight turn to the left to attempt to reach the highway. I immediately realized I couldn't reach the highway and continued my turn to the left, making a 180° autorotation to make an approach to a canal which was the only area available to me.

"It was obvious that a normal autorotation would not make the canal. I attempted to use cyclic and collective to maintain enough altitude to clear the trees bordering the canal, but missed by five feet. The skid and bubble struck the trees and the aircraft seemed to turn on its left side and fall almost straight down, coming to rest on its left side just inside the canal clearing. I remained in the aircraft for approximately 20 minutes before I was rescued and taken to a hospital."

The pilot sustained fractures, abrasions, and lacerations which the flight surgeon estimated would keep him in the hospital for six months and ground him for a year. The aircraft was destroyed at a cost of $41,450.

The investigation board found the primary cause to be fuel exhaustion and listed contributing factors as:

Violation of paragraph 24, AR 95-2, VFR Fuel Reserve Requirements.

Aviator's desire to return home and arrive before sunset.

Aviator's reluctance to wait longer for refueling, which would have required flight plan extension or refiling, for which he was doubtful about getting proper VFR weather.

A lack of responsive refueling facilities at the airfield where he landed.

Operating aircraft in a known low fuel state over terrain that was unsuitable for an emergency or forced landing.

Get-home-itis

In Proud Remembrance

of the achievements of her sons and in humble tribute to their sacrifices this memorial has been erected by the United States of America

1941-1945 * 1950-1953**

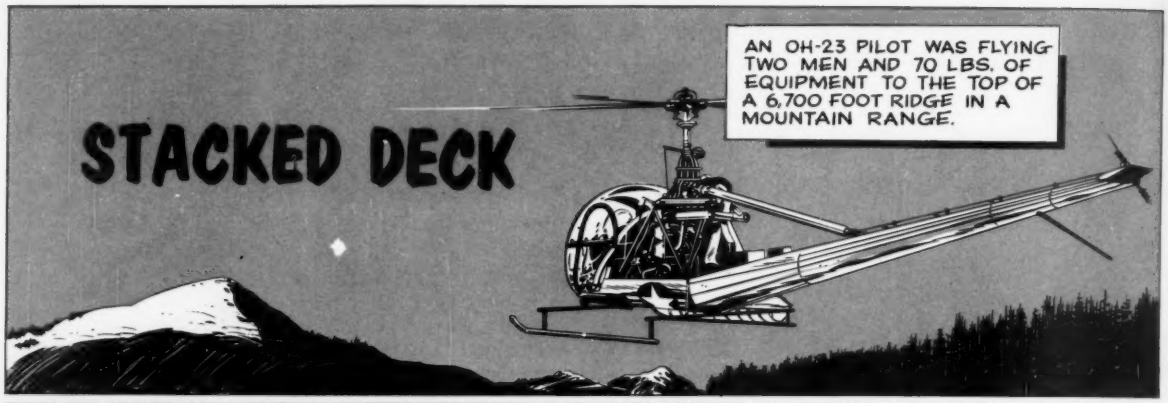
THE AMERICAN Battle Monuments Commission announces the dedication, May 1, of the Honolulu Memorial, erected at the National Cemetery of the Pacific in Honolulu, Hawaii. This is the last of 19 major World War II memorials built by the Commission and is the only one which also commemorates the lost and missing from the fighting in Korea.

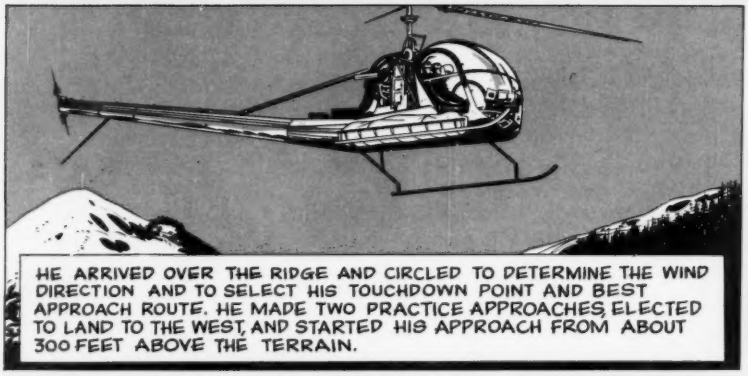
Standing on the inner face of the Puowaina crater, the memorial overlooks the National Memorial Cemetery of the Pacific, also located in the crater. It consists of a Court of Honor high on the crater wall; a chapel in the Court of Honor with a 30-foot statue on its facade; two galleries extending laterally from each side of the chapel, in which are located 10-foot high World War II and Korean battle maps; a monumental seven-tiered stairway rising from the cemetery floor to the Court of Honor; and eight memorial Courts of the Missing, four flanking each side of the stairway.

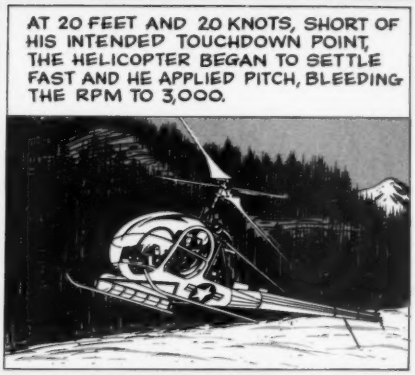
Engraved in lasting tribute on the walls of these courts are the names of 18,093 servicemen and women of World War II missing in action or lost or buried at sea in the Pacific area (other than the Southwest Pacific) and 8,187 service personnel of the Korean War. Those lost and missing in the Southwest Pacific are memorialized at the Manila American Cemetery and Memorial in the Philippines.

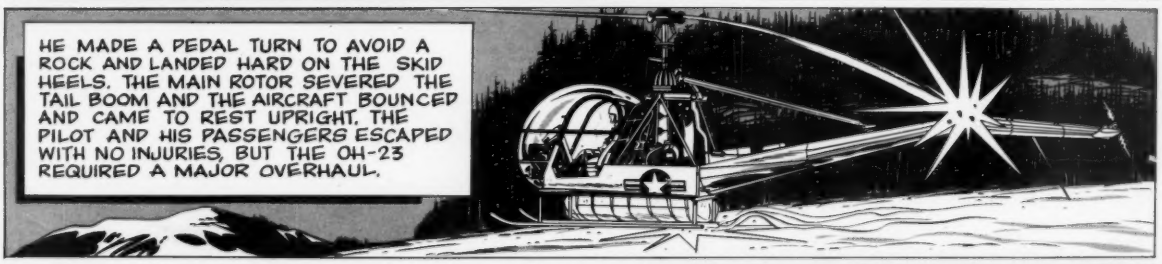
Puowaina crater, popularly known as the "Punch Bowl," is an extinct volcano just a few miles from downtown Honolulu. Buried in the cemetery are the repatriated remains of 13,000 service personnel of World War II and the Korean War.

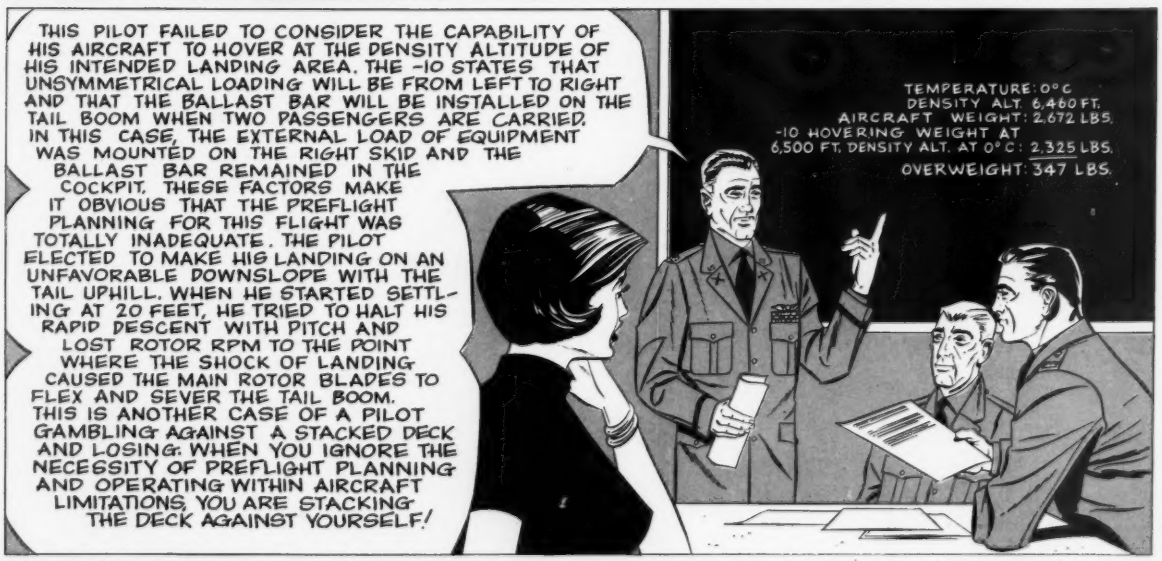
STACKED DECK




HE ARRIVED OVER THE RIDGE AND CIRCLED TO DETERMINE THE WIND DIRECTION AND TO SELECT HIS TOUCHDOWN POINT AND BEST APPROACH ROUTE. HE MADE TWO PRACTICE APPROACHES, ELECTED TO LAND TO THE WEST, AND STARTED HIS APPROACH FROM ABOUT 300 FEET ABOVE THE TERRAIN.


AT 20 FEET AND 20 KNOTS, SHORT OF HIS INTENDED TOUCHDOWN POINT, THE HELICOPTER BEGAN TO SETTLE FAST AND HE APPLIED PITCH, BLEEDING THE RPM TO 3,000.


HE MADE A PEDAL TURN TO AVOID A ROCK AND LANDED HARD ON THE SKID HEELS. THE MAIN ROTOR SEVERED THE TAIL BOOM AND THE AIRCRAFT BOUNCED AND CAME TO REST UPRIGHT. THE PILOT AND HIS PASSENGERS ESCAPED WITH NO INJURIES, BUT THE OH-23 REQUIRED A MAJOR OVERHAUL.


THIS PILOT FAILED TO CONSIDER THE CAPABILITY OF HIS AIRCRAFT TO HOVER AT THE DENSITY ALTITUDE OF HIS INTENDED LANDING AREA. THE -10 STATES THAT UNSYMMETRICAL LOADING WILL BE FROM LEFT TO RIGHT AND THAT THE BALLAST BAR WILL BE INSTALLED ON THE TAIL BOOM WHEN TWO PASSENGERS ARE CARRIED. IN THIS CASE, THE EXTERNAL LOAD OF EQUIPMENT WAS MOUNTED ON THE RIGHT SKID AND THE BALLAST BAR REMAINED IN THE COCKPIT. THESE FACTORS MAKE IT OBVIOUS THAT THE PREFLIGHT PLANNING FOR THIS FLIGHT WAS TOTALLY INADEQUATE. THE PILOT ELECTED TO MAKE HIS LANDING ON AN UNFAVORABLE DOWNSLOPE WITH THE TAIL UPHILL. WHEN HE STARTED SETTLING AT 20 FEET, HE TRIED TO HALT HIS RAPID DESCENT WITH PITCH AND LOST ROTOR RPM TO THE POINT WHERE THE SHOCK OF LANDING CAUSED THE MAIN ROTOR BLADES TO FLEX AND SEVER THE TAIL BOOM. THIS IS ANOTHER CASE OF A PILOT GAMBLING AGAINST A STACKED DECK AND LOSING. WHEN YOU IGNORE THE NECESSITY OF PREFLIGHT PLANNING AND OPERATING WITHIN AIRCRAFT LIMITATIONS, YOU ARE STACKING THE DECK AGAINST YOURSELF!
TEMPERATURE: 0° C
DENSITY ALT. 6,460 FT.
AIRCRAFT WEIGHT: 2,672 LBS.
-10 HOVERING WEIGHT AT 6,500 FT. DENSITY ALT. AT 0° C: 2,325 LBS.
OVERWEIGHT: 347 LBS.

PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH